IMPERIAL MYCOLOGICAL INSTITUTE
20 APR. 1933

BERMUDA

REPORT

OF THE

DEPARTMENT

OF

AGRICULTURE

FOR THE YEAR

1932

PUBLICATIONS OF DEPARTMENT.

Annual Reports for 1932 backward. Some numbers are out of print.

Monthly Agricultural Bulletin will be posted monthly on request. Back copies may be obtained, if still in print.

Legumes as Green Manure, by the Director (1915).

Hints on Growing Vegetables, by the Director (1918).

Common Diseases of Horses, Cattle and Swine, by R. L. Tucker, formerly Government Veterinary Officer (1922).

Flower Garden Calendar, Chiefly of Annuals, by Bermuda Garden Club (1927).

Insects of Bermuda, by L. Ogilvie, formerly Plant Pathologist of Department (1928).

Recent Developments in the Marketing of Bermuda Vegetables, by the Director (1932).

Copies of the above may be obtained free on request.

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Board of Agriculture, 1932.

Honble. S. S. SPURLING, C.M.G., O.B.E., M.C.P., St. Georges, Chairman to 19th August.

Wor. B. C. C. OUTERBRIDGE, J.P., M.C.P., Smiths, Deputy-Chairman to 19th August, Chairman from 20th August.

Mr. F. C. MISICK, M.C.P., Sandys, Deputy-Chairman from 20th August.
Mr. W. A. H. BARNES, Southampton.
Mr. JOS. DE MOURA, Southampton.
Wor. T. H. H. OUTERBRIDGE, J.P., M.C.P., Hamilton.
Mr. E. W. OUTERBRIDGE, Hamilton.
Mr. E. J. MONIZ, Devonshire.
Mr. J. M. DARRELL, M.C.P., Smiths.

Department of Agriculture, 1932.

Director of Agriculture, E. A. MCCALLAN.
Plant Pathologist, T. A. RUSSELL, B.Sc., A.R.C.S., A.I.C.T.A., Dip. Agr. (Cantab.)
Agricultural Assistant, W. R. EVANS.
Inspector of Produce, E. L. ADAMS.
Horticulturist, J. C. NAUEN.
Clerk, HILDA C. LINES.

PART-TIME OFFICERS.

Government Veterinary Officer, C. J. COOPER, V.S.
Acting Government Veterinary Officer, E. S. BROWNE, B.V.Sc., from 2nd to 20th October.

Assistant Inspector of Produce, T. ARTHUR HOLLIS.
Sub-Inspectors of Produce, C. V. S. EARLY, J. W. M. GIBBONS, T. J. OUTERBRIDGE and M. F. KING.

Agricultural Station,

Paget East, Bermuda,

20th February, 1933.

Sir,

I am directed by the Board of Agriculture to lay before His Excellency the Governor, for the information of the Legislature, the accompanying reports of the Department of Agriculture for the year ended 31st December, 1932.

I have the honour to be,

Sir,

Your obedient servant,

HILDA C. LINES,

Clerk, Board of Agriculture.

The Honourable,

The Colonial Secretary,

Hamilton.

Report of The Director of Agriculture, 1932

The Chairman,
The Board of Agriculture.

I have the honour to submit herewith reports of the Department of Agriculture for the year 1932.

BERMUDA AGRICULTURE IN 1932

During the year under report the volume of vegetable exports to Canada increased, and vegetable and bulb exports to the United States decreased. Generally, the year was one favourable to Bermuda farmers, the unhappy exceptions being largely those whose chief crops were lily bulbs or celery. Though the increase in the year's exports was less than £14,000 over that of the previous year, there was among farmers much greater confidence regarding the Canadian market for Bermuda vegetables.

Value of Agricultural Exports.—The sales and *nett farm values of agricultural exports were as follows:

	Sales.	Nett farm values
To Canada	£45,600	£37,200
To United States	22,200	11,300
To United Kingdom	1,020	850
To British West Indies	170	100
To other countries	25	15
	£69,015	£49,465

For the first time exports to Canada exceeded in value exports to the United States.

Exports, Quantities and Countries. Following are given the quantities of vegetables and bulbs exported, and the countries to which they were exported:

*Nett farm price was arrived at by deduction from sales of the ocean and land freights (when the latter was paid) and marketing charges. The cost of crates and Packing House charges were not deducted.

Vegetable	U. K.	Canada	B. W. I.	U. S. A.	Other foreign Countries	Total
Beans, bushels	—	233	—	—	—	233
Beets, "	—	1,369	—	—	—	1,369
Cabbage, "	—	11,994	—	—	—	11,994
Carrots, "	—	17,773	—	126	—	17,899
Celery, "	—	46,472	—	2,532	—	49,004
Cucumbers "	—	313	—	—	—	313
Kale, "	—	—	—	14,544	—	14,544
Onions, "	—	29,034	329	49	—	29,412
Potatoes, "	—	7,397	344	28,184	—	35,925
Spinach, "	—	587	—	—	—	587
Tomatoes, "	—	10,238	3	—	—	10,241
Miscellns. "	—	762	—	535	—	1,297
Totals, bushels	—	126,172	676	45,970	—	172,818
Lily bulbs, cases	340	86	—	2,571	12	3,009

Based on nett farm value, agricultural exports were divided among the five markets during last three years as follows:

	1930	1931	1932
Canada	14.8%	28.1%	75 %
United States	83.8	70.2	23
United Kingdom	1.1	1.4	1.7
British West Indies	.06	.06	.2
Other countries	.2	.2	

Produced for Local Consumption. It is estimated that the following quantities and values of locally-produced agricultural products were consumed in the Colony during the year:

Bananas	72,000	bunches	£22,000
Bulbs, planting stock	1,000,000	bulbs re-planted	2,500
Eggs	126,000	doz.	19,000
Milk	456,000	gals.	76,000
Pork and other meats	414,000	lbs.	10,700
Potatoes	75,000	bushels	26,000
Vegetables, other	240,000	bushels	78,000
			£232,200

Annual Values of Agricultural Products, 1928-1932.

The estimated annual values of local agricultural products consumed locally and exported during the last five years were as follows:

Year	Consumed locally	Exported	Total
1928	£190,000	£ 92,000	£282,000
1929	191,200	106,400	297,600
1930	211,000	104,000	315,000
1931	176,500	35,600	212,100
1932	189,255	49,365	238,620

SALE OF BERMUDA VEGETABLES IN CANADA.

The quantity of vegetables exported to Canada in 1932 was 217 per cent of the average of the previous five years. Weather conditions were

clement, except at the opening of the year, prices were good and Canadian exchange was favourable to those selling in that country.

Gross Prices.—Below are given comparisons of the prices at which vegetables were sold in Canada during the last three seasons:

	1930	1931	1932
Beans, 1-bu. ct.	—	—	$1.38
Beets, 1-bu. ct.	1.40	1.42	1.57
Cabbage, 3-bu. ct.	3.37	2.45	3.49
Carrots, 1-bu. ct.	1.39	1.31	1.89
Celery, 2-bu. ct.	2.84	2.98	2.74
Cucumbers, 1-bu. ct.	—	—	2.39
Onions, 1-bu. ct.	1.12	2.04	1.67
Potatoes, 1-bu. ct.	1.97	1.94	1.86
Spinach, 1-bu. ct.	—	—	1.35
Tomatoes, 20-lb. lug	1.19	1.33	1.49

In the winter and spring of 1932 Canadian domestic supplies of cabbage, carrots and onions were low, and as a result higher prices were obtained for Bermudas than would otherwise have been received. For a time celery, too, found very favourable market because of the Canadian embargo on California celery; this was later removed, and increasing shipments of Bermuda celery further lowered its price.

Nett Farm Prices.—The nett farm prices during the last three years, with seventeen per cent added this year as Canadian exchange, were as follows:

	1930	1931	1932
Beans	—	—	4/–
Beets	3/9	4/2	5/–
Cabbage	9/–	6/6	11/3
Carrots	3/8	3/9	6/3
Celery	3/6	6/11	8/–
Cucumbers	—	—	8/11
Onions	3/6	6/11	5/11
Potatoes	5/3	6/1	6/3
Spinach	—	—	4/3
Tomatoes	4/–	4/4	5/5

Nett Farm Value.—The nett farm-value of vegetable exports to Canada during the year totalled £37,100, as compared with £9,248 in 1930 and £9,900 in 1931. If to the 1932 farm value is added £297 paid as wharfage, and £2,950 as commission to the local shippers, the Bermuda value of the crop amounts to £40,347. The sum of $29,800 (Canadian and American currency) was paid as ocean freight.

Comparison of 1931 and 1932 Exports.—Increased prices were not secured in 1932 through decreased exports to Canada, for exports were greatly in excess of those of the previous year, as shown, in bushels:

	1931	1932
Beans	10	233
Beets	620	1,369
Cabbage	5,109	11,994
Carrots	10,956	17,773
Celery	8,906	46,472
Cucumbers	20	313
Onions	3,360	29,034
Potatoes	1,763	7,397
Spinach	20	587
Tomatoes	4,900	10,238
Miscellaneous	81	762
Totals	35,771	126,172

Sales by Each Broker.—Below are given the approximate quantities of vegetables sold by each of the three representative brokers, namely, Messrs. J. W. Gorham and Co., Halifax, N.S.; Messrs. J. Hunter White, Ltd., Saint John, N.B., and Messrs. the Mutual Brokers, Ltd., Montreal, P. Q. The quantities accurately represent neither the full nor relative requirements of the three markets.

	Halifax	Saint John	Montreal	Total
Beans	34	105	94	233
Beets	659	517	193	1,369
Cabbage	1,917	1,421	660	3,998
Carrots	4,771	6,550	7,052	18,373
Celery	708	1,870	20,658	23,236
Cucumbers	92	125	96	313
Onions	5,646	5,682	17,706	29,034
Potatoes	1,134	381	5,882	7,397
Spinach	284	287	16	587
Tomatoes	6,381	8,184	16,248	30,813
Miscellaneous	188	69	505	762
Totals, crates	21,814	25,191	69,110	116,115

Exports and Prices by Months.—Below are given the approximate monthly quantities and the average monthly prices of vegetables sold in Canada during the season of seven months, January to July:

	Jan.	Feb.	Mar.	Apr.	May	June	July
Beets, crates	0	44	352	449	504	20	0
Ave. prices	...	$1.54	$1.50	$1.38	$1.72	$2.03	...
Cabbage, crates	0	75	1,121	1,047	1,085	633	37
Ave. prices	...	$3.30	$3.30	$3.59	$3.39	$2.66	$2.11
Carrots, crates	31	2,307	3,967	1,525	5,192	3,575	1,674
Ave. prices	$1.50	$1.50	$1.78	$1.92	$1.94	$2.10	$1.75
Celery, crates	0	20	0	1,343	18,592	2,943	338
Ave. prices	...	$3.50	...	$3.68	$2.58	$2.09	$2.15
Cucumbers, crates	0	20	0	0	28	239	26
Ave. prices	...	$3.50	...	...	$2.19	$2.34	$1.10
Onions, crates	0	0	0	72	11,348	16,070	1,544
Ave. prices	...	...	...	$2.50	$1.75	$1.30	$1.10
Potatoes, crates	4	0	0	0	2,943	2,960	1,544
Ave. prices	$1.75	...	...	...	$2.42	$1.42	$1.36
Spinach, crates	0	35	249	183	109	11	0
Ave. prices	...	$1.50	$1.52	$1.30	$1.50	$ .50	...
Tomatoes, crates	23	173	43	92	1,120	20,698	8,664
Ave. prices	$1.40	$1.47	$1.50	$1.05	$1.82	$1.85	$1.31
Monthly totals, crates	58	2,674	5,742	4,701	40,921	47,159	13,827

A Longer Season.—Farmers are advised to spread their shipments over a longer period in each shipping season by making earlier shipments. This advice is offered with the knowledge that late prices are, in the majority of cases, higher than are prices at the commencement of the season. It is not practicable, however, to make all shipments within the period of maximum prices. In particular, earlier shipments of potatoes should be made. The extension of the celery shipping season appears to be practicable. See further reference under "Major Crops" and in the Assistant's report.

Ocean Transport.—The "Lady" steamers of the Canadian National Steamships make possible the Colony's vegetable export trade to Canada, but on occasions in the year under report the facilities offered were inadequate, both with respect to frequency of service and cold or cool storage space. Increased storage with controlled temperatures, a weekly service from December to April, inclusive, and bi-weekly boats in May and June are essential to the full development of vegetable exports from Bermuda to Canada.

Representations by Chairman of Trade Development Board.—In May the late J. P. Hand, C.M.G., M.B.E., M.C.P., then Chairman of the Trade Development Board, proceeded to Ottawa and Montreal to make representations to the Canadian Government and the Management of the Canadian National Steamships on behalf of the agricultural interests of Bermuda. Mr. Hand was eminently successful in his mission, and secured results of great benefit to the farmers of the Colony, who with all the other people of Bermuda, mourn his untimely death on 13th January, 1933.

Departmental Representative.—For two periods, aggregating sixteen weeks, Mr. W. R. Evans, Agricultural Assistant, was on duty in Canada, and performed extremely useful work. See his report on following pages.

Visit of Brokers.—The three brokerage firms which sell Bermuda vegetables in Canada sent representatives to Bermuda in November. On 19th the following arrived: Mr. F. E. Holloway, President and General Manager of Messrs. the Mutual Brokers, Ltd., Mr. C. H. Gorham, President of Messrs. J. W. Gorham and Co., and Colonel C. F. Leonard of Messrs. J. Hunter White, Ltd. Until their departure at daybreak on 23rd these representatives were extremely busy interviewing farmers, shippers, members of the Board and Department and others interested in the sale of Bermuda vegetables in Canada.

Publication of Information.—Steps were taken to keep farmers well informed regarding market conditions. Visits were paid to farms, and information received from the brokers and the Board's representative was published in the local newspapers. The major part of the space in the monthly Bulletin was devoted to marketing and subjects allied to it. Crop reports were issued to Canadian buyers interested in Bermuda vegetables. The Department appreciates the kindness of the editors of the Royal Gazette and Colonist Daily, the Mid-Ocean and the Recorder in publishing information furnished by the Department.

DECLINE IN SALES IN U. S. A.

Sales in the United States of America of vegetables and lily bulbs have rapidly declined in recent years, as shown below:

	Vegetables, bushels	Bulbs, cases
1928	399,294	7,064
1929	308,294	5,172
1930	190,353	4,719

	Vegetables, bushels	Bulbs, cases
1931	85,903	3,659
1932	45,970	2,571

In 1932 exports of celery to New York ceased after the first few shipments, and this resulted in a great increase in exports to Canada, as mentioned elsewhere in these reports. With the exception of early potatoes and small quantities of kale, there is not at present a profitable market in New York for Bermuda vegetables. The demand for Bermuda Easter lily buds and bulbs may again increase when general business conditions improve.

GOVERNMENT-PACKED VEGETABLES.

Inadequate Packing House Accommodation.—The extension to the Station Packing House, completed early in 1932, proved to be far too small to accommodate the greatly increased quantities of vegetables which were brought in to be graded and packed. Two Felins vegetable tyers were purchased, but no other additions were made to the plant because of lack of funds.

Increase in Quantities Packed.—Below are given the quantities of vegetables packed by the Department during the last three seasons:

	1930	1931	1932
Beans, crates	0	0	203
Beets, "	0	81	926
Cabbage, "	0	173	2,281
Carrots, "	0	3,067	11,881
Cucumbers, "	0	0	183
Onions, "	0	744	9,491
Potatoes, "	0	664	4,360
Spinach, "	0	0	430
Tomatoes, "	1,333	9,207	24,267
Miscellaneous, "	0	32	591
Totals, crates	1,333	13,968	54,613

In Percentages of Total Shipments.—In percentages of the total shipments to Canada the increases in the 1932 Government pack over that of the previous year were pleasing, as shown below:

	1931	1932
Beets	13%	67%
Cabbage	10	57
Carrots	28	67
*Celery	0	0
Onions	20	32
Potatoes	38	59
Tomatoes	63	78

*No provision was made to pack celery.

Southampton Packing House.—The Government Packing House in Southampton was open from 5th February to 21st April, and was closed because of reduced quantities of vegetables delivered for packing, and labour scarcity which made it necessary to do the bulk of the work at night.

The following quantities were packed in Southampton by the Department, and are included in quantities given under "Increase in Quantities Packed":

Beets	153	crates
Cabbage	128	"
Carrots	2,430	"
Total	2,711	crates

No provision was made to pack onions, potatoes and tomatoes.

Receipts by Parishes.—The approximate quantities of vegetables received at the Packing Houses from each Parish are given below. (The farmer's residence fixed the parish credited for producing the vegetables, which in some cases, was grown in adjoining parishes.)

	St. Geo.	Ham.	Smith.	Dev.	Pem.	Paget	War.	South.	Sand.	Total
Beans	0	22	35	18	3	5	13	107	0	203
Beets	0	200	179	0	0	50	121	376	0	926
Cabbage	15	401	583	77	0	90	241	874	0	2281
Carrots	123	694	1474	500	15	2030	1580	5420	45	11881
Cucumbers	14	0	90	14	0	15	10	40	0	183
Onions	10	561	752	83	77	587	537	6833	51	9491
Parsley	0	3	98	0	0	200	108	103	0	512
Potatoes	0	238	396	214	21	207	433	2851	0	4360
Spinach	0	0	91	31	0	34	234	40	0	430
Tomatoes	469	1006	11443	5007	50	1008	1069	4008	209	24267
Miscellaneous	0	8	60	2	9	0	0	0	0	79
Total crates	631	3133	15201	5946	175	4224	4346	20652	305	54613
Percentages	1	6	28	11	.03	8	8	37	.05	

Labour Costs.—Little reduction was made in labour costs per crate, which were reduced from 6.5 pence to 6.088 pence per crate. No other factor added so much to labour costs as did the scarcity of crate material during the time of heavy shipments. Increased packing facilities, adequate stocks of crate material, information from farmers regarding their probable deliveries to the Packing House, and the delivery of onions and potatoes in advance of the more perishable vegetables would greatly reduce labour costs.

Farmers' Attitude towards Government Packing.—During the year farmers became much more friendly towards Government packing, nor was this surprising having regard to the premium generally received for vegetables bearing the Colonial Mark.

Dissatisfaction was caused chiefly by loss of boxes. The Department assumed no responsibility for returnable farm boxes and barrels, and it is regrettable that some farmers "borrowed" empties not their own. It is planned to control this next season.

The percentage of errors in returns of quantities packed was less than one per cent. Receipts should have been given both for vegetables received and packed; it is planned to issue such receipts next season.

Markets' Preference for Government Pack.—As the season advanced the Canadian buyers' preference for Government-packed vegetables became

more pronounced. Farmers should realise that when the supply of Government-packed vegetables reaches, or nearly reaches, the Canadian demand for Bermuda vegetables, farm-packed vegetables will sell at relatively low prices.

Plans for Season of 1933.—On 25th June and at subsequent meetings the Board discussed plans for dealing with the anticipated increased quantities to be offered next season at the Government Packing House. These plans were modified from time to time because of circumstances. At the close of the year it appeared probable that a central packing house and precooling plant would be erected at the dock in Hamilton, but that the plant would not be ready for use in 1933. The Department, therefore, proceeded to make additions to the Station Packing House and to erect a temporary building near Evans Bay Railway Station, Southampton.

Resolution of Conference of Colonial Directors of Agriculture.—Because it bears directly on the policy of the Board respecting the Department's responsibility in regard to grading and packing farmers' vegetables, the following resolution of the Conference of Colonial Directors of Agriculture held in London in July, 1931, is included in this report:

> VIII. **Produce Inspection.**—The Conference is of opinion that produce inspection and grading are essential to the improvement of quality in most agricultural products, and for the economic welfare of the producers. When semi-official agencies are not available, it is considered that, when the quality of the product can be improved by inspection and grading, such service should be undertaken by Government as a normal function of a Department of Agriculture. The costs of such inspection and grading service should be borne by the industry concerned, although it is possible that in the initial stages of its inauguration some assistance from public funds towards the capital expenditure involved and towards the inauguration of the service may be justified. . . . . Government purchase schemes for produce may be suitable in the beginning for the encouragement of a new crop, but are not recommended for any extended use.

MAJOR CROPS.

Carrots.—Exports of carrots during the last five years were as follows:

1928	42,250	bushels
1929	7,994	"
1930	19,255	"
1931	10,956	"
1932	17,899	"

In 1929 plantings of carrots dropped suddenly, due to shippers no longer buying locally. The quantity exported in 1931 was reduced by unfavourable weather. Carrots are likely to again become a very important export vegetable, if a type suitable to the requirements of the Upper Canada market can be secured; for information regarding selection of carrots, see Assistant's report. It is regretted that the seed distributed by the Department did not prove generally suitable for main crop planting. For information regarding disease control, see report of Plant Pathologist.

Tomatoes.—Exports of tomatoes during the last five years were as follows:

1928	1,584	bushels
1929	8,051	"
1930	6,581	"
1931	4,900	"
1932	10,241	"

The 1932 crop was the largest yet shipped, but was a very late one, for little more than 1 per cent was shipped during January to April, 5 per cent in May, 67 per cent in June and 27 per cent in July. Growers are strongly advised to endeavour to make earlier shipments without lessening the quantity shipped later.

About twenty-five per cent of the fruit grown was not suitable for shipment. This loss can be reduced by better cultivation and more careful handling. Counts made at the Packing House in late June showed that tomatoes had been rejected for the following causes, (percentages are of the total rejected): Injury by disease or insects, 52 per cent; immature, 24 per cent; scalded, 8 per cent; mechanically injured, 7 per cent, undersized, 3 per cent; blossom-end scarred, 3 per cent, and stem-end cracked, 1 per cent. See report of Plant Pathologist.

The demand in Canada for tomato "Gems" is very weak, and is likely to disappear when the supply of large sizes meets the demand. It is impossible to give the differences obtained for large tomatoes and "Gems" throughout the season and in all markets, for the two were not always separated on the brokers' returns to the Department, but in Halifax "Gems" sold for from 57 cents to $1.15 below the prices obtained for large tomatoes.

Tomato growers should aim to increase the size of their fruit and decrease the number of "Gems" by planting on more heavily manured land, increasing the distances between the plants, and picking fewer small, immature fruit.

Celery.—Exports of celery during the last five years were as follows:

1928	129,266	bushels
1929	155,894	"
1930	113,080	"
1931	46,510	"
1932	49,004	"

Early in the shipping season it was found expedient to discontinue shipments to New York, and 95 per cent of the crop, or 46,472 bushels, was sold in Canada. This was a very large increase over previous shipments to that market, and prices obtained reflected credit on the brokers, and on the Agricultural Assistant. The bulk of the shipments, 48 per cent, was made in May. The growing of celery seedlings in Canada for transplanting in Bermuda is likely to meet the demand for early celery. For further information on the marketing of celery and growing seedlings, see Assistant's report.

Onions.—Exports of onions during the last five years were as follows:

1928	16,063	bushels
1929	4,055	"
1930	10,737	"
1931	3,412	"
1932	29,412	"

Weather conditions were highly favourable to onions, and unusually large yields were obtained, as high as 1,600 bushels per acre in some cases.

The bulbs were for the most part clean, bright and dry; the best crop exported for many years. Prices obtained in Canada were remarkably good, having regard to competition from other sources, the great increase over our recent exports, and the large part of the shipments that were crowded into a few weeks.

Reference is made by the Assistant to the experimental tests made in Canada to grow onions for seed. The selection work begun in 1925 was continued.

Potatoes.—Exports of potatoes during the last five years were as follows:

1928	110,136	bushels
1929	97,875	"
1930	65,953	"
1931	38,435	"
1932	35,925	"

Potato exports have declined rapidly during the last five years. A larger percentage of the crop is consumed locally, however.

A pleasing feature respecting potato exports is the rapid increase in exports to Canada, which have been as follows:

1928	115	bushels
1929	192	"
1930	452	"
1931	1,763	"
1932	7,397	"

Canada will not for many years, if ever, purchase Bermuda potatoes in the quantities that New York formerly did, and if remunerative prices are not obtained in the latter market, potato exports will continue to decrease, at least for a time.

Cabbage.—Exports of cabbage during the last four years (it is a new export vegetable) were as follows:

1929	1,014	bushels
1930	2,061	"
1931	5,109	"
1932	11,994	"

Prices, so far, have been fairly good. Seeding should be strictly confined to the Charleston Wakefield variety. For information regarding disease control, see report of Plant Pathologist.

Lily Bulbs.—Exports of the bulbs of the Bermuda Easter lily *(L. longiflorum,* var. *eximium;* trade name, *L. Harrisii)* during the last five years were as follows:

1928	7,611	cases
1929	5,864	"
1930	5,508	"
1931	4,270	"
1932	3,009	"

The steady decline of exports since 1928, the record year, has been due largely to the World depression, and the situation has been worse than indicated by the above figures, for prices, also, have fallen, and it is probable that an increasingly larger part of the crop has been shipped on consignment to bring the growers very small returns. Farmers are advised to reduce their plantings until trade revives.

In May a meeting was called to discuss the effect of the export of buds on the sale of bulbs. Obviously, the consignment of either is not con-

ducive to good prices, but as the lily trade is passing through a period of depression, the Board is not eager to enforce further restrictions of any kind.

The number of growers and areas under cultivation during the last four years are given below:

	Growers	Acres
1929	154	58.1
1930	157	62.7
1931	156	56.2
1932	103	44.0

Plantings in the autumn of 1932 were further reduced.

The advertising scheme, developed by Mr. F. H. Burn, of the Bermuda Trade Development Board, London, was continued in 1932. Under the scheme British horticultural societies numbering thirty-five advertised Bermuda bulbs in their show catalogues, and in exchange received one dozen bulbs each to be offered as prizes to their members. The Empire Marketing Board assisted by giving publicity in the press to the Bermuda bulbs grown at the Royal Botanical Gardens, Kew, and Hyde Park, London.

The Board decided to exhibit Bermuda lilies in bloom at the exhibit of the Lily Conference to be held in London in 1933. In the 1932 Lily Year-Book of the Royal Horticultural Society there appeared a comprehensive article, "A Visit to the Bermudian Lily Fields", by Col. G. S. F. Napier, who visited the Colony in February.

Copy of the report of the Board's London representative, Messrs. Robert Tucker and Co., will be found in Appendix A. It reflects great credit on Messrs. Tucker that sales were so well maintained.

MINOR CROPS.

Export Crops.—Information regarding the demand for export vegetables will be found in the report of the Assistant. Chief among the minor crops are beans, beets, cucumbers and New Zealand spinach.

Green Manure Crops.—The summer of 1932 was highly favourable to the growth of green manure crops, as noted by the Assistant, but very few farmers profited. In no other particular does the Bermuda farmer show himself a poor husbandman than in his neglect of leguminous green manure crops.

Citrus.—The weather was favourable to citrus, also, and good yields were obtained from the few trees under cultivation. Land owners should grow citrus fruits for family use.

Other Fruits.—The area under strawberries was increased, and the crop was profitable to most farmers. Bananas, undamaged by high winds, cropped well.

PURCHASE OF ROTOTILLER.

By Resolve 11 funds were voted to purchase a Model K 5 Rototiller. The machine was rented to farmers at thirty-five shillings per day. It found instant favour with the majority, and did satisfactory work in a variety of soils and under varying conditions. It is expected that it will be particularly useful in preparing celery land.

SOIL ANALYSES.

Requests for soil analyses having been received during the year, two analyses made in 1931 by the Imperial Institute, London, are published in Appendix B.

DOMESTIC LIVE STOCK.

See report of the Government Veterinary Officer regarding the control of infectious animal diseases and number of animals imported. No serious outbreak of disease occurred, and the one outbreak of hog cholera was confined to the farm on which it originated.

Representation was made to the Board regarding the inability of pig-feeders to dispose of their stocks, and unsuccessful efforts were made to increase the duty on imported pork.

Dairy stock continued to show improvement due to the use of Guernsey bulls. Registered bulls are needed in several districts.

CONTROL OF PLANT DISEASES AND PESTS.

See report of Plant Pathologist.

It is regretted that the last report of the former Pathologist, Dr. H. S. Cunningham, Ph.D., M.S.A., B.S.A., which covered the period 1st. January to 15th May, 1931, was by inadvertence not included in last year's reports. It will be found in Appendix C.

The Pathologist records two new pests, both of which threaten to be troublesome to growers. The situation respecting the spread of the palmetto scale is alarming, and calls for immediate action.

INSPECTION AND REGULATORY SERVICES.

See reports of officers of Department dealing with this subject.

Bye-laws were in force during the year relating to (1) infectious animal diseases, (2) plant diseases and pests, (3) inspection and exportation of nursery stock, (4) inspection and exportation of produce, (5) importation and sale of seed potatoes, and (6) sale of vegetable seeds. Copies of Bye-laws may be obtained on request.

Amendments were made with respect to the specifications of the two-bushel crate.

Licensed Shippers of Produce.—The following persons and firms held licenses from the Board to ship produce:

Benevides and Rego, Hamilton.
Bermuda Green Vegetable Growers' Association, Hamilton.
J. M. Darrell, Harrington Sound.
O. R. Loblein, Hamilton.
Pearman, Watlington and Co., Hamilton.

The following persons held licenses from the Board to ship produce grown by them individually:

F. A. Hollis, Southampton West.
Malcolm Hollis, Harrington Sound.
E. J. Moniz, Devonshire.
Jos. deMoura, Southampton West.
Bento Oliveira, Southampton West.
E. W. Outerbridge, Shelly Bay.
J. R. Outerbridge, Devonshire.
D. C. Robinson, Devonshire.
M. F. Simons, Paget.
R. B. Watson, Paget.

Licensed Shippers of Lily Bulbs.—The following persons and firms held licenses from the Board to ship Bermuda Easter lily bulbs:

T. O. Covel, Hamilton.
Henry and Lee, Hamilton and New York.

T. A. Hollis, Sr., Crawl.
E. W. Outerbridge Co., Hamilton.
J. R. Outerbridge, Devonshire.
H. E. D. Smith, St. Davids.
Stephens Bros., Paget.

Registered Seed Vendors.—The following persons and firms were registered by the Board as vendors of vegetable seeds:

Benevides and Rego, Hamilton.
Bermuda Green Vegetable Growers' Association, Hamilton.
P. A. Dodwell, Hamilton.
Henry Dunkley and Co., Hamilton.
Hill Co., Hamilton.
O. R. Loblein, Hamilton.
J. R. Outerbridge, Devonshire.
J. H. P. Patterson, Somerset.
Peniston and Curtis, Hamilton.
T. J. Wadson and Son, Hamilton.
J. Wright, St. Georges.

ANNUAL AGRICULTURAL EXHIBITION.

The thirteenth Annual Agricultural Exhibition was held at the Agricultural Station on Tuesday, Wednesday, Thursday and Friday, 12th, 13th, 14th and 15th April. Heavy rain fell on the afternoon of the opening day, and made it necessary to carry forward each day's event to the following day, hence a four-day show. The Exhibition was in most particulars a decided advance on its predecessors.

The doubt which existed for several weeks as to whether the necessary grant-in-aid would be made or not upset some plans, but in the end proved a blessing, for its many supporters rallied to the Exhibition, which in the end was better than it would otherwise have been.

Generally speaking, exhibits reached or exceeded the standards of former years. The outstandingly good classes were vegetables, flowers, and Club or school children's exhibits. Of the last-named, information will be found in "Boys' and Girls' Agricultural Clubs."

A very determined effort was begun months previous to the Exhibition to secure an exceptionally good show of vegetables. Seeds were distributed and other efforts made to increase interest in this class, and vegetable growers, both adults and Club members, responded loyally. The result was the best show of vegetables ever staged in the Colony. Exhibitors' vegetables were augmented by an exhibit arranged by the Department, which contained sixty-five kinds of vegetables, of which about sixty had been grown at the Station.

The exhibits of flowers were also considered the best yet shown, and filled a tent 130 feet long.

The Exhibition buildings were strained to their utmost. Only one room in Montrose House was available, and it was necessary to move the Poultry exhibits into the Packing House, and use the Poultry building for Arts and Crafts exhibits, crowded out of their building, and for Food Products. Vegetables, also, were shown in the Packing House, but this was made possible only by fair weather on the two days in which vegetables were packed (out of doors) for export. The risk was one that will not be taken again.

A larger number than usual of meetings were held previous to the Exhibition, and though the attendance was large at none, the interest shown at these meetings was sustained to the close of the Exhibition. Generally speaking, the Parish Committees were much more active than in previous years.

His Excellency the Governor was among the successful exhibitors, and won first prize for a splendid collection of vegetables as well as other prizes. His Excellency kindly consented to judge horses, and quickly arrived at decisions which met with general approval. He and Lady Cubitt in many other ways showed their interest in the Exhibition and their appreciation of its value to the community.

At the close of the Exhibition the Executive Committee met twice to prepare a report for the consideration of the Board. It will be found in Appendix D.

Following are figures which show the growth of the Exhibition.

	Entries	Estimated Attendance	Gross takings
1928	4,702	15,000	£802
1929	5,303	14,000	802
1930	5,886	15,000	827
1931	6,848	16,000	928
1932	7,047	16,000	908

Below are compared the number of entries in each Class (a) at Rosebank during 1893—1903 (average), (b) at the Agricultural Station in 1922 when the Exhibitions were resumed after the War, and (c) in the year under report.

	(a)	(b)	(c)
Horses	22	86	136
Cattle	29	46	87
Pigs	10	2	14
Goats	—	25	40
Rabbits	—	13	130
Poultry	79*	37	279
Dogs	49	43	114
Cats	21	—	—
Vegetables	207	88	668
Fruits	—	9	96
Flowers and plants	168‡	181	1,419
Food products	85	136	1,283
Arts and crafts	254	304	2,781
Totals	924	970	7,047

The Department is under obligation to the more than three hundred unpaid workers who contributed their time and interest to make the 1932 year the most successful yet held.

Following will be found special prizes liberally donated by persons interested in the Exhibition, and the fortunate winners.

Asser Challenge Cup.—St. Georges Parish won the Silver Challenge presented in 1927 by His Excellency the Governor, General Sir J. J. Asser. The Cup was held by Mr. H. E. D. Smith.

S. P. C. A. Prizes.—Mr. E. R. Williams, Pembroke, won the first prize of two pounds for hack horse.

*Including rabbits. ‡Including fruit.

Mr. Warren Burrows, Paget, won the second prize of one pound for hack horse.

Mr. Fred Smith, Pembroke, won the first prize of two pounds for truck horse.

Mr. Peter De Silva, Devonshire, won the second prize of one pound for truck horse.

Bermuda Railway Company Challenge Cup.—Mr. W. H. D. North, Pembroke, won the Silver Challenge Cup presented by the Bermuda Railway Company, Ltd., for the best dairy animal in the show.

Barnes' Challenge Cup.—No award was made for the best Jersey cow.

Bermuda Poultry and Pet Stock Association's Cup.—Mr. A. B. Stephens, Paget, won the Association's Cup for the best exhibit of one breed.

Faulkner Shield.—Mr. A. B. Stephens, Paget, won the Faulkner Shield for the best bird in the show.

Roosevelt-Roosevelt Cash Prize.—Mr. Harry Garcia, Smiths, won the cash prize of five pounds for vegetables, presented by Mrs. J. Roosevelt-Roosevelt.

Board's Prize of Seeder.—Mr. W. A. Young, Pembroke, won the Board of Agriculture's prize of a Planet Jr. seeder for the largest number of prizes won for vegetables.

Board's Gold Medals.—The following won the medals presented by the Board of Agriculture for vegetables: Mr. F. G. Brangman, St. Georges; Mr. Jos. De Moura, Southampton; Mr. Harry Garcia, Smiths; Mrs. F. C. Misick, Sandys; Mr. H. E. D. Smith, St. Georges; Mr. W. A. Young, Pembroke.

Carter Silver Challenge Cup.—Mrs. D. R. A. Bettington, Paget, won the Challenge Cup presented by Messrs. James Carter and Co., for vegetables and flowers grown from the firm's seeds.

Ryder Medal—The Bermuda Development Company, Tuckers Town, won the Medal presented by Messrs. Ryder and Son, Ltd., for flowers grown from the firm's seeds.

Montgomery Sears Challenge Cup.—For the third time Mr. Roy Mayor, Paget, won the Silver Challenge Cup presented by Mrs. Montgomery Sears for annual cut flowers.

Roosevelt-Roosevelt Cash Prize.—Mr. Roy Mayor, Paget, won the prize of two pounds presented by Mrs. J. Roosevelt-Roosevelt for Gerberas.

Board's Gold Medals.—The Bermuda Development Company, Tuckers Town, and the Fairy Isle Flower Shop, Hamilton, won the Board's gold medals for flowers.

Covel's Cash Prizes.—Mrs. Hugh Gray, Sandys, and Mrs. Florence Wadson, Paget, won first and second prizes respectively, presented by Mr. T. O. Covel, for luncheon table decoration. Mr. Hugh Gray, Sandys, and Mrs. Florence Wadson, Paget, won first and second prizes respectively, presented by Mr. T. O. Covel, for library table decorations.

Purvis Cash Prize.—Mrs. Clifford Williams, Southampton, won the cash prize presented by Messrs. W. S. Purvis and Co. for bread made with Robin Hood Flour.

Board's Certificates.—Certificates were presented by the Board of Agriculture to Messrs. Moirs, Ltd., for exhibit of box material; Premier

Furniture Co., for exhibit of furniture; Miss Winifred Rogers, for Kindergarten educational exhibit; and Mr. W. B. Smith, for exhibit of Lili perfumery and Hercules lime.

FINANCIAL STATEMENT.

Receipts.

	1931	1932
Balance brought forward	£ 15 8 1	£ 102 10 6
Granted by Appropriation Acts and Resolves	400 0 0	345 0 0
Donated for special prizes	22 0 0	17 0 0
Gross receipts for advertisements in catalogue and programmes	146 19 0	136 5 0
Ground rents	95 0 9	108 18 0
Entry fees	8 11 7	6 16 0
Gate receipts	492 13 9	481 4 0
Enclosure receipts	136 19 4	130 5 7
Bicycle receipts	26 0 8	18 16 2
Receipts for meals	... ...	6 15 0
Miscellaneous receipts	... ...	... 15 0
Unpaid prizes	2 15 0	7 15 6
Totals	£1,345 18 2	£1,362 0 9

Expenditure.

	1931	1932
Prizes to adults	£ 410 13 0	£ 419 15 3
Prizes to Clubs	194 11 3	195 7 9
Prizes for sports	24 19 10	20 5 0
Paid for exhibits lost	2 0 2	1 3 0
Advertising	39 16 3	37 7 5
Printing and commission on advertisements in Catalogue and programmes	119 10 0	114 9 8
Stationery and printing	37 7 5	114 2 2
Distribution of seed	20 3 7	... ...
Lumber	15 13 0	56 11 8
Other material	78 6 9	75 11 9
Carriages and meals for Exhibition helpers	15 12 0	36 7 0
Cartage	32 6 0	22 3 0
Checking bicycles	10 0 0	10 0 0
Checking cloaks	1 5 0	1 2 6
Clerical assistance	47 15 0	50 6 0
Field labour	119 19 11	124 15 3
Watchmen	6 0 0	6 0 0
Gatekeepers	34 10 0	26 0 0
Depreciation, rental, etc. of W. D. stores	29 18 6	26 13 7
Lighting and telephones	3 0 0	6 13 10
Balance carried forward	102 10 6	... ...
Unexpended balance	... ...	17 5 11
Totals	£1,345 18 2	£1,362 0 9

BOYS' AND GIRLS' AGRICULTURAL CLUBS.

Work in the Clubs was practically confined to the preparation of exhibits for the Annual Agricultural Exhibition. During the last two years carelessness in preparing exhibits had been evident. Several months previous to the Exhibition forty-two schools were visited, and the necessity to improve the exhibits was brought to the attention of scholars and teachers. The response was in every way satisfactory, and the exhibits reflected great credit on Club members and their instructors.

The educational exhibit of kindergarten methods and material arranged by Mrs. Heber Browne, Miss Winifred Rogers and their helpers was fully appreciated by teachers, and should have a marked effect on next year's Kindergarten exhibits.

Each year a number of liberal special prizes are donated, and these greatly encourage the members of the Clubs.

The handsome silver challenge cup presented in 1926 by Honble. W. J. H. Trott, M.C.P., having been twice won by the Club of Southampton East School, Mr. Trott readily agreed that if this or any other Club wins the cup three times, it will become the property of the Club.

Montgomery Sears Cup.—Whitney Institute Club won the Cup presented by Mrs. Montgomery Sears for the greatest advance over the previous year's performance.

B. G. V. G. A. Challenge Cup.—Jose Alfred Pedro of Whitney Institute Club won the Bermuda Green Vegetable Growers' Association Cup for vegetables exhibited by a boy.

Jackson Challenge Cup.—Mary Hollis of Whitney Institute Club won the Cup presented by Hon. W. E. Jackson for vegetables exhibited by a girl.

S. P. C. A. Cash Prizes.—Joan Harvey of Mount St. Agnes Club won first prizes for the most original humane poster, and Nesta Thomas of the same Club won second prize.

Angeline Lindo of Dudley Hill School Club won first prize for the best designed and executed poster, and Lucille Cabral and Richard Johnson of the same Club won respectively second and third prize.

Pickett Prizes.—Dorothy Benevides of Dudley Hill School Club, John M. Bell of Whitney Institute Club, Kenneth Horton of West End Grammar School Club and Rosemary Champness of St. Georges Grammar School Club won prizes presented by Mr. A. M. Pickett for Arts and Crafts of unusual merit.

AGRICULTURAL STATION.

For information about vegetable experiments and live stock, see report of Agricultural Assistant. For information about horticulture, see report of Horticulturist.

Office Work.—The packing and shipping of farmers' vegetables by the Department greatly increased office work, and delayed the preparation of the report for the previous year, the presentation of monthly reports, and the compilation of statistics for the Blue Book and other publications. Late in the shipping season permission was granted to employ extra clerical assistance, but funds were not then available.

During the year 1,568 letters were received, and 2,260 dispatched. An unusually large number of circular letters were dispatched and dealt

chiefly with marketing. The Agricultural Bulletin, now in its twelfth year, was issued each month with fair regularity. The clerical work of the Exhibition was performed at a cost of £50. 6. 0. for extra assistance.

Publications Received and Issued.—The receipt of a large number of useful publications from various agricultural and other institutions is gratefully acknowledged.

No special publications were issued except some leaflets of information regarding marketing, and a bulletin, "Recent Developments in the Marketing of Bermuda Vegetables" by the Director. On inside of front cover will be found a list of publications obtainable free on application.

Visitors.—Visitors to the Station included His Excellency the Governor, Sir Thomas Astley-Cubitt, K.C.B., C.M.G., D.S.O.; His Excellency the Acting Governor, Honble. E. J. Waddington, O.B.E.; members of the Empire Parliamentary Delegation; members of the Canadian Trade Cruise; Sir Algernon Aspinall, Honble. J. H. Grisdale, Canadian Deputy Minister of Agriculture; Mr. F. A. Stockdale, Agricultural Adviser to the Colonial Office; Mr. Frederic Hudd, Canadian Trade Commissioner; Col. G. F. Napier; Dr. E. M. East of Harvard University; Dr. W. H. Peterson of Wisconsin University; Dr. J. F. G. Wheeler of Bermuda Biological Station; Mr. E. E. Long; Mr. A. C. Shill, Marketing Officer of Leeward and Windward Islands; Mr. C. H. Hayward, representative of Messrs. J. and E. Hall; Mr. A. E. Lawrence, orchid collector; Mr. B. A. Blakeney, Mr. W. Cluney and Mr. M. A. Marshall, Canadian fruit and vegetable dealers; and Mr. A. J. Masterman, Assistant Secretary of Co-operative G. L. F.

Repairs and Additions.—An addition to the Packing House, 60 feet long and three stories high, was completed. Extra (movable) tomato bins were made. A post-and-rail fence was put up beside the drive east of the Exhibition ring, and the fence around the ring was repaired. Work was begun on a new slat-house. Tools and implements were repaired.

Prison Labour.—Prison labour amounted to 454 man days, and was employed at widening and grading the drive east of the Ring, grading the hillside above the drive south of the Packing House, lime-washing, cleaning about the Packing House, and Exhibition work. The cost to the Department was £13. 12. 0.

Extension of Hospital.—The extension of the King Edward VII Memorial Hospital, recognised as an essential public work, has lost to the Station a relatively large area of its best agricultural land.

Disposal of Produce.—See Appendix E.

Rainfall.—See Appendix E.

STAFF.

Mr. E. A. McCallan, Director of Agriculture, was on vacation leave from 21st July to 4th August. On 28th December he left the Colony to attend the Eighth Annual Convention of the Canadian Fruit and Vegetable Jobbers' Association, to be held at Toronto on 4th, 5th and 6th January, 1933. The Director continued on the Board of Trustees of the Bermuda Biological Station for Research, and attended the annual meeting in New York on 31st December.

Mr. T. A. Russell, Plant Pathologist, was on vacation leave from 22nd to 28th August, and on sick leave from 19th September to 7th October.

Mr. W. R. Evans, Agricultural Assistant, was on duty in Canada in connection with the marketing of vegetables, from 2nd to 24th March and

from 21st April to 11th July. A report dated 6th August was presented, and a resume appeared in the August and September numbers of the Bulletin. Mr. Evans acted as Director during Mr. McCallan's absence in Canada and the States. Mr. Evans continued to hold the office of Honorary Secretary-Treasurer of the Bermuda Poultry and Pet Stock Association.

Mr. E. L. Adams, Inspector of Produce, was granted vacation leave from 28th October. Mr. T. Arthur Hollis, Assistant Inspector of Produce, acted for Mr. Adams from 28th November.

Mr. J. C. Nauen, Horticulturist, was permitted to accept the post of Honorary Secretary of the Bermuda Garden Club.

Dr. C. J. Cooper, Government Veterinary Officer, was on vacation leave in Canada and the United States from 5th to 20th October. Dr. E. S. Browne was appointed Government Veterinary Officer during Dr. Cooper's absence.

Miss Hilda C. Lines, Clerk, was on vacation leave from 22nd to 28th August.

Mr. C. V. S. Early, Station Foreman, completed twenty-two years' service with the Department on 22nd May. He is not entitled to pension on retirement.

FINANCIAL.

The expenditure of £7,300. 0. 0. was authorised by the Appropriation Act of 1931, and Resolves 11 and 17 of 1932. The sum of £7,276. 7. 4. was expended and a balance of £23. 12. 8. remained at the close of the year's accounts. These amounts are all exclusive of salaries. The sum of £466. 7. 1. was reimbursed to the Treasury. Details of expenditure and reimbursements will be found in Appendix F.

During the last ten years the expenditure of the Department (exclusive of salaries) and the receipts for the sale of vegetables, etc. were as follows:

Year.	Expenditure.	Receipts.
1923	£4,163 6 10	£ 75 0 11
1924	4,515 10 8	182 19 3
1925	4,851 16 7	129 18 9
1926	5,169 6 5	207 8 9
1927	4,560 15 5	346 2 4
1928	4,175 5 11	157 10 8
1929	4,348 6 10	193 0 1
1930	6,952 14 2	247 18 9
1931	7,418 3 3	280 1 1
1932	7,276 7 4	466 7 1

Respectfully submitted,

E. A. McCALLAN,
Director of Agriculture.

Agricultural Station,
Bermuda.
27th January, 1933.

Report of the Plant Pathologist, 1932.

Director of Agriculture,

I have the honour to submit my report on the work done and on the occurrence of diseases and pests during the year 1932.

GENERAL REVIEW.

Diseases and pests have caused serious damage to many crops throughout the year, and, while most of them have been the familiar troubles of past years, a few have to be recorded for the first time. Chief of these are the potato tuber moth, *Phthorimaea operculella* Zell, and the tomato pinworm, *P. lycopersicella* Busck., both of which were observed but not indentified in 1931, and a thrips on gladiolus which is probably *Taeniothrips gladioli*, Moulton. The fungus *Sclerotinia Sclerotiorum* (Lib.) de Bary., which has been reported in the past as attacking lettuce, cabbage, and celery in Bermuda, is now to be recognised as the cause of a serious rotting of carrots in transit.

Of fungous diseases probably the most injurious was blight of celery due to *Septoria apii*, which destroyed at a rough estimation fully one-third of the crop. Damage caused by *Sclerotinia Sclerotiorum* was almost as great, being distributed over several vegetable crops, including carrots, lettuce, and tomatoes. Since much of the farming land appears to be contaminated with this fungus, it will probably continue to be a severe hindrance to the successful growing of crops; and it has accordingly been made the subject of special study, the results of which are described in another section. Bacterial diseases were representd by a soft-rot of cabbages due to bacteria of the *Bacillus carotovorus* group, and by the Black-rot of Crucifers due to *Bacterium campestre*, which was widespread on kale and turnips in the last months of the year. The virus disease known as Yellow Flat caused heavy losses amongst the Easter lilies, all affected plants having to be removed before the lilies were certified as fit for sale. Leaf-roll of potatoes occurred to a serious extent in the Triumph crop during the autumn.

Insect pests also caused heavy losses in some of the crops, and a few call for special mention. Severe damage to potatoes stored over the summer was caused by the tuber moth, *Phthorimaea operculella*, an account of which is given in a later section. Losses of tomatoes on the vine were heavy, and were largely due to insect pests. The pests and diseases of the green tomato were made the subject of special study, to be described later. The beet fire-worm, *Hymenia fascialis*, wiped out the autumn-sown beet crop. The tomato leaf-folder or fireworm, *Psara periusalis*, besides damaging tomato plants in summer, was very destructive to the autumn crop of Triumph potatoes, causing severe defoliation in some fields. The cabbage crop was badly attacked by larvae of the noctuid, *Phytometra brassicae*, in the latter months of the year. Scale insects were abundant throughout the year. The palmetto scale, *Comstockiella sabalis*, is spreading, and the situation is to be regarded as serious.

It is evident that, if damage to crops by diseases and pests is to be kept down, improved measures of control are necessary. Spraying and dusting are generally practised on such crops as potatoes, tomatoes, and celery, but there is a tendency to postpone action till disease has taken charge instead of getting in ahead of the disease. Other methods of control are largely neglected, and it is by adoption of them that further suc-

cess is to be expected, in my opinion. The most important of these is clean farming. Diseased material is often left to rot on the ground instead of being burned or removed from the field. This was noticed in the case of fields of celery rendered unfit for sale through blight. The diseased crop in some instances was left standing in the field for weeks, and was then ploughed in, thus storing up trouble for the next celery crop. Furthermore, weeds left in the field often form a hot-bed for fungous diseases and insect pests. The fungus *Sclerotinia Sclerotiorum* thrives on a large number of the common weeds, and can then go on vigorously to attack a crop that is subsequently planted. Similarly the beet fireworm, *Hymenia fascialis*, will flourish on a diet of calulu or purslane until the beet seedlings are up above the ground. Suitable crop rotation is admittedly difficult in land which has to bear from three to four crops a year, but I consider that increased attention to this would lead to significant reduction in the incidence of diseases and pests, especially if the land could be rested at intervals.

OFFICE WORK.

The office work has included correspondence on plant pathological matters, the writing of monthly and special reports and articles for the monthly Bulletin, and the maintenance of the laboratory equipment in good condition. The pathological library has been kept in order, and journals and reprints have been reviewed as soon as possible after their arrival, and papers of interest have been indexed. The reprints are being re-arranged, and the index is under revision.

MAJOR PROBLEMS INVESTIGATED.

Sclerotinia Diseases of Vegetables.—Early in March news was received from Montreal that two shipments of bunched carrots showed much rotting on arrival. It was mentioned that similar trouble had been noticed before in Bermuda carrots, though never to such a great extent. The trouble was at first assumed to be due to excessive refrigeration, but from samples of carrots retained at the Station and from crates returned from Canada, it was later found to be due to attack of a fungus, which was identified as *Sclerotinia Sclerotiorum* (Lib.) de Bary. This is well known in Bermuda as the cause of Drop in lettuce, and is also known to occur on tomatoes, celery, and cabbage. In the Report of the Plant Pathologist for 1924 it is recorded as having been noticed on carrots. In the United States it is described as the most important storage rot of root crops.

Small samples were taken from the rejects of all lots of carrots brought in to the Packing House, with a view to discovering how wide was the occurrence of the trouble and whether it was affected by weather conditions such as temperature and rainfall. The fungus was found to be present and to develop under favourable conditions on almost every lot of carrots brought in. No correlation was found between rainfall and occurrence of the trouble, though this may have been due to unrepresentative sampling. Washed carrots were found to be no more susceptible than unwashed, but it was proved that maintaining carrots under damp conditions for some time before packing led to severe attack. It is probable that if cold storage facilities were available so that the carrots could be reaped, packed, and chilled within a few hours, this rotting would cease to give any trouble.

Attack by Sclerotinia on lettuce was widespread and severe. In December it was found causing serious damage to tomato plants in a field in Devonshire. In every case noticed, infection had started in a leaf, and

had travelled down the petiole into the stem, where it had spread both upwards and downwards. Fruits were attacked generally through the fruiting-spur, a greyish brown rot being caused. The typical black sclerotia were produced on the surface and in the hollow of the stem, and very large ones formed in rotted fruits. Cabbages in a neighbouring field were also severely attacked by the fungus.

It is of interest to note that infection of tomato and cabbage plants was aerial, and in the former case occurred at some distance above ground, being caused apparently by spores. A search was, therefore, made for the fruit-bodies which might have produced these, but all efforts to find them failed. Laboratory experiments have been undertaken with a view to finding under what conditions the fungus produces fruit-bodies in Bermuda.

Control of this fungus in the field is difficult. Besides attacking a wide range of crop-plants and of weeds, it is believed to be capable of persisting in the soil for some time in absence of a suitable host-plant. During the year it has been seen on the following crop-plants: Lettuce, endive, carrot, salsify, cabbage, celery, fennel. In the flower-beds it was found on Centranthus, Centaurea, and Cynoglossum, and in a cultivated field on the following common weeds: *Galinsoga parviflora, Euphorbia heterophylla, Argemone mexicana, Fumaria muralis, Lamium amplexicaule, Trifolium sp.* (clover).

Pests and Diseases of the Green Tomato Fruit.—A survey was made in the field and amongst the fruit rejected at the Packing House to ascertain the chief causes of loss of tomato fruits. The most important of the pests and diseases are briefly described.

The most destructive single organism was the larva of a small moth, identified at the Imperial Institute of Entomology as *Phthorimaea lycopersicella, Busck.* It caused rather characteristic damage, boring into the fruit under the calyx and burrowing into the core. It proved to be heavily parasitised by the Ichneumon, *Angitia blackburni*, Cam., so that great difficulty was experienced in obtaining the adult moth. As the larva is said to feed on the leaves before penetrating the fruit, it should readily be controlled by a stomach poison, if the parasite were to prove ineffective.

Several other caterpillars were found inside tomato fruits, three types of Noctuid larvae being particularly harmful to the Station crop in the autumn. These made a clean hole at any portion of the fruit and went on to devour the contents. One of these larvae was suspected of being *Heliothis obsoleta*, but attempts to rear it to maturity failed.

The most common disease was Bacterial Soft-rot or Leak, due to *Bacillus carotovorus* or *B. aroideae*, which proved troublesome at the end of the shipping season in June. It is said to occur only in fruit which has been wounded or bruised.

Brown-rot, due to *Rhizoctonia solani*, was occasionally seen. The rot appears as a circular dull brown spot with zoned markings, situated towards the blossom end of the fruit. The fungus was isolated from a diseased tomato, and the disease was reproduced in a healthy fruit by artificial inoculation. It was also produced in a healthy tomato which was allowed to rest on inoculated soil. In both cases, very damp conditions were necessary for infection. The disease is believed to occur only on fruit close to, or resting on, the ground, and should be controlled by improved bushing or staking of the vines.

Attack on the fruit caused by *Sclerotinia Sclerotiorum* was seen only in the winter months, and has already been commented on.

Scab Spot, a disease of unknown cause, was troublesome in a number of fields. The damage caused is purely on the surface, and consists of unsightly sunken black scabby spots, usually about 1½ mms. across. A species of *Phoma* was isolated from such spots, but attempts to reproduce the trouble by inoculation have so far failed.

Non-parasitic disorders which caused much loss included Splitting or Cracking of the fruit, due to excessive variation in the water-supply, and Sun-scald, which was found commonly towards the close of the shipping season when the sun became hot and the foliage sparse.

The Potato-Tuber Moth, Phthorimaea operculella, Zell.—Damage to potatoes stored in barrels, caused by a small worm, was reported by a grower in Paget in 1931. In the summer of 1932, similar trouble was widespread, and proved to be due to larvae of the tuber moth. It was seen at, or reported from, numerous places between Southampton in the west and Hamilton Parish in the east. Much loss was caused in Bermuda potatoes stored over the summer for seed and for consumption, the damage consisting first, in the destruction of the buds in the eyes, so that the potato failed to sprout, and second, in the rotting of the tuber which normally followed attack by the worm. Still more alarming perhaps was the attack on Long Island seed, 100 barrels imported by a grower in Southampton showing severe infestation three weeks after their arrival in Bermuda. These were saved by timely fumigation with carbon bisulphide, and ultimately yielded a good crop.

The tuber moth threatens to become one of our most serious pests, on account of the loss caused to potatoes and of the lack of known measures of control which are at all effective. Observations, which have so far been made, suggest that trouble will be confined to the summer months, so that our export crop should be entirely free from the pest. During the autumn, larvae were found mining the leaf-blades and petioles of plants in the field, but no case of attack on the tubers was seen. An interesting feature of the occurrence on the foliage was the high percentage of parasitism that prevailed. Of eleven larvae collected from potato leaves and reared in the laboratory during November and December, only one produced the adult moth, the other ten giving rise to the Ichneumon fly, *Angitia blackburni,* Cam. During attack by the larvae on the tubers in the summer, however, cases of parasitism were rare.

Measures recommended against this pest include the following:

(1) Addition of lead arsenate to the usual Bordeaux spray or dust used on the potato crop.

(2) Thorough earthing-up of potatoes in the field, so that no tubers are exposed, and thus liable to attack.

(3) The storing of potato tubers for as short a time as is practicable and under the best possible conditions, well-housed and in sound barrels.

(4) Fumigation of potatoes with carbon bisulphide at the first sign of attack. This operation requires strict precautions, but was carried out with success on two occasions by the Department.

Minor investigations included a study of oleander scale, a rot of freesias, and a wilt of tomato plants. Along with the Horticulturist, a study of the Easter lily is being made with special reference to texture of the flower.

ADVISORY WORK.

Advice on the control of diseases and pests has been given to growers throughout the year. Periodic visits paid to some of the larger farmers in company with the Agricultural Assistant proved valuable in enabling me to find out their chief pathological troubles. While many growers are keenly observant of any trouble in their crops, most of them accept it with resignation, so that it may not be reported to the Department.

Assistance has been given to gardeners on numerous occasions, and addresses on the control of diseases and pests were given before the Garden Club of Bermuda and that of Sandys Parish.

The crops on the Station grounds have been supervised with respect to diseases and pests, and treatment has been recommended when necessary.

INSPECTION SERVICES.

Lily Inspection.—The first inspection of lily fields was started on 15th January, and finished a week later. A second round was made in March, and, as many fields were looked at a third time, the inspection was not completed till the beginning of May. During the first two inspections I was accompanied by Mr. T. Arthur Hollis, Assistant Inspector of Produce, whose assistance proved valuable.

Of 155 fields surveyed, 145 passed the final inspection, giving a total area of 6,931 sq. rods or 43.3 acres. Of the 10 fields which were condemned, amounting to 151 sq rods, 7 fields or 135 sq. rods failed on account of yellow flat disease. This disease gave great trouble, and was, I am told, exceptionally severe this season. It may have been helped by the attitude of some of the growers, who, doubtful if they would be able to sell their bulbs, were unwilling to go to any trouble or expense over their lilies. A number of the growers, on the other hand, kept their fields with scrupulous care, realising that in these bad times only first-class bulbs could satisfy the buyer and retain a place in the market.

Inspection of Plant Importations.—During the year I inspected 262 packages of imported plants and bulbs, 183 at the Post Office and 79 at the docks. Of these, 237 were passed at the time of inspection, while 9 were passed after treatment, in most cases fumigation with hydrocyanic gas. In 16 cases, plants or bulbs were confiscated and destroyed. These included a bundle of sugar-cane affected by a borer, not identified; some plants of chives attacked by dipterous larvae; iris bulbs affected by the aphid, *Anuraphis tulipae*, and by a bulb-rot; citrus trees and sweet potatoes from a prohibited area; and bananas imported contrary to Bye-laws.

Inspection of Plant Exportations.—Numerous plants and bulbs were examined and certified as free from disease previous to their being exported. The lily packing-sheds were visited during the packing period.

Inspection of Vegetable Seed for Disease.—The celery seed imported from France showed a high percentage of blight infection, amounting to over 80 per cent in the case of Golden Plume. Two consignments of this seed were condemned as unfit for planting, and were returned to the seedsman in France. Supplies from Canada showed a much lower degree of infestation, not more than 10 per cent infection being seen. Treatment with Bayer Dust was given to all seed showing only slight infection.

SPRAYING SERVICE.

The two motor-sprayers were kept in working order throughout the year, one being kept up at Southampton and the other at the Station. They

were in fair demand, one or other being in use on 41 days, chiefly for spraying potatoes, celery, lilies, palmettos and other ornamental trees. The hand dusting-machines were used extensively on the crops of potatoes and tomatoes grown in the Station grounds. Supplies of oil emulsion were prepared from time to time, and were distributed for the control of scale insects.

THE CHIEF DISEASES AND PESTS OBSERVED DURING THE YEAR.

Antirrhinum.—Snapdragon rust, *Puccinia antirrhini,* was first noticed in February, and was almost universal on snapdragons during early summer.

Bananas.—Black-tip, *Helminthosporium torulosum,* occurred during the summer months, but no serious loss was seen.

String Beans.—Mildew, *Erysiphe polygoni,* was severe, but the use of sulphur dust gave some control.

Beets.—Fireworm, *Hymenia fascialis,* destroyed the autumn-sown crop. Lead arsenate dust gave partial control, but during the wet weather of November it proved impossible to protect the plants.

Cabbage and Kale.—Soft- rot, *Bacillus carotovorus* group, was troublesome on cabbages in March, and caused loss during shipment. Head-rot, *Sclerotinia Sclerotiorum,* caused severe loss in one field in December. Black-rot, *Bacterium campestre,* was widespread and destructive during the autumn, particularly on kale.

Carrot.—The Sclerotinia rot, *S. Sclerotiorum,* was by far the most destructive disease.

Celery.—Septoria blight, *S. apii,* caused serious loss. Blackheart occurred towards the end of the season. Early blight, *Cercospora apii,* was seen on early celery during the latter month of the year.

Citrus.—Attack by scale insects necessitated periodic spraying with oil emulsion on many trees. Anthracnose, *Gloeosporium limetticolum,* was troublesome on young shoots of lime trees on St. Davids. This can be controlled by spraying with Bordeaux mixture.

Corn.—The earworm, *Heliothis obsoleta,* was very destructive.

Cucurbits.—The melon-borer, *Margaronia hyalinata,* caused heavy losses of fruit. The powdery mildew, *Erysiphe cichoracearum,* occurred commonly on the foliage. The downy mildew, *Pseudoperonospora cubensis,* and thrips, probably *Thrips tabaci,* were troublesome on cucumbers grown under glass.

Freesia.—Early in the year, several beds of freesias belonging to a grower were destroyed, through a rotting which occurred at soil level.

Similar trouble occurred in the Station grounds in December. In both cases a species of Fusarium was isolated.

Gladiolus.—Thrips caused severe damage to gladioli in Devonshire in early summer. The leaves were badly attacked, but the chief injury was to the buds which were distorted and mutilated. The thrips have been identified as a species of *Taeniothrips,* probably *T. gladioli* Moulton, which is proving destructive in the North American Continent.

Lettuce.—Drop, due to *Sclerotinia Sclerotiorum,* caused widespread and serious loss.

Lilies.—Yellow flat disease was severe on the Easter lily crop, and mosaic was common. The *Phytophthora* disease was very rare, and Botrytis blight was not seen.

Oleander.—Scale, *Aulacaspis pentagona*, was abundant early in the year, but became greatly reduced towards the summer, probably as a result of parasitic attack.

Onions.—The downy mildew or true blight of onions, *Peronospora Schleideni*, occurred at the Station on plants grown from sets which were brought down from Canada. The plants were so badly attacked as to be rendered worthless. This disease has not been recorded in Bermuda for several years.

Palmetto.—The scale, *Comstockiella sabalis*, was destructive, and is unfortunately spreading. It has obtained a hold on the palmettos in Paget Marsh, and also occurs in Pembroke, as well as in the eastern parishes.

Potatoes.—Late blight, *Phytophthora infestans*, caused little trouble during the year. The fireworm, *Psara periusalis*, was abundant, and caused severe defoliation of the autumn Triumph crop. The Long Island seed contained a high percentage of leaf-roll infection, and the Canadian seed had much mosaic.

Tomatoes.—Septoria blight, *S. lycopersici*, was destructive throughout the year, and where spraying was not carried out regularly, it shortened the life of the vines. Leaf mould, *Cladosporium fulvum*, was also common. The fireworm, *Psara periusalis*, and the hornworm, *Phlegethontius sexta*, destroyed the foliage during the warmer months. Severe attack of wilt was seen in one field in August, and a species of Fusarium, probably *F. lycopersici*, was isolated. Diseases and pests of the fruit are described elsewhere.

RECORD OF MOVEMENTS.

I was absent on vacation leave in Bermuda during the third week in August, and on sick leave from 19th September to 10th October.

ACKNOWLEDGMENTS.

On completing my first year in Bermuda, I should like to record my warm appreciation of the kindness shown by all members of the Department on my arrival and their helpfulness during the succeeding months. I am indebted to the Imperial Institute of Entomology for identifying a number of insects and to the Imperial Mycological Institute for advice in the control of disease.

Respectfully submitted,

T. A. RUSSELL,

Plant Pathologist.

27th January, 1933.

Note.—Plant Pathologist's Report for 1931, inadvertently omitted from last year's Reports, will be found as Appendix B.

Report of the Agricultural Assistant, 1932.

The Director of Agriculture,

I have the honour to submit my report for the year 1932.

The usual experimental work was curtailed on account of the claims of grading, packing and marketing on the time of the staff and the Station workmen.

AGRICULTURAL STATION.

Vegetable Seed Tests.—During the season 316 samples of seed were tested for viability. Of this number 93 samples were from registered local seed vendors, and 123 samples were purchased direct by the Department from various sources. The following results were obtained:

Germination,	good to very good,	65 per cent
"	fair,	13 " "
"	poor,	22 " "

Farmers frequently complain of poor stands secured from seed purchased from local seed vendors. Seeds do not hold their germinating power long under local conditions, and it frequently happens that seeds which give satisfactory results at the beginning of the season fail to germinate towards the middle of the season. Seed vendors usually import the major part of their requirements for the season during July and August, and it often happens that the farmer does not plant it until November or later. Due to our growing season being the reverse of most countries, we must of necessity use seed of the previous season's crop for early plantings, but since seed of the current season's crop becomes available in November, both vendors and farmers are advised to limit their early purchases to their immediate early requirements.

FIELD TESTS.—These tests were not as extensive as formerly, as already noted.

The following vegetables were tested:

Beans, bush.—Sixteen samples were tested. As in former tests, Bountiful gave consistently good results. Tennessee Green Pod, though somewhat coarser than Bountiful, is hardier, more resistent to mildew and a heavier cropper; both are recommended. None of the wax varieties gave satisfactory results.

Beets.—Nine samples were tested. During the early part of the season fireworms were troublesome, notwithstanding frequent applications of arsenicals. Crosby's Egyptian and Early Wonder appear to be similar, and are recommended.

Cabbage.—Thirteen samples were tested. Charleston Wakefield is recommended for both local and export purposes. Farmers generally plant too many varieties, with the result that there is little uniformity in exported cabbage.

Carrots.—Thirty-nine samples were tested in an effort to find a variety suitable for Canadian market requirements. Several strains of Amsterdam were tested. None of these came up to expectation, and until further experiments are carried out no definite recommendation can be made regarding new varieties. Danvers Half Long is a heavy cropper, and for shipping to the Maritimes with the tops cut off it is recommended.

Spinach.—Twelve samples were tested. Of the varieties tested the New Zealand type is the most prolific and hardiest. More attention should be given to spinach as an export vegetable to Canada.

Tomatoes.—On account of pressure of work in connection with marketing, observations with respect to late or main crop plantings had to be abandoned. The following remarks refer to the autumn planting only.

Twenty samples were tested. Seed was sown on 22nd August, 1931, and the seedlings planted out in the field on 13th October. The first picking was made on 11th December, and the last picking on 14th March. Weather conditions during the season were more favourable than in the previous year, but early blight caused considerable damage, and on that account the crop was reduced.

The vines were planted in double rows 18 inches apart each way and thirty-six inches between rows. The plants were staked to one-quarter inch round iron rods, 5 feet long, in units of four, and the ends brought together and tied. This is a recommended way to produce early fruit, as during the short and dull days of late autumn and early winter, it is difficult to get the fruit to set unless the vines are staked off the ground. Other advantages are: (a) Ease of cultivating, dusting or spraying and reaping, (2) greater freedom from injuries, and (3) larger yield per acre. The disadvantages as compared with the prevalent farm practice of bushing or growing on the ground are: (1) Labour of tying and pruning, and (2) cost of stakes.

The highest yield was given by Break O'Day, which was 1.7 pounds per plant as compared with 1.5 pounds per plant by Dreer's Bonny Best, or 16,456 pounds and 14,520 pounds per acre respectively.

POTATO TESTS.

Winter Planting.—Chili Garnets planted in South Field on 8th January were badly damaged by wind during the early stages of growth. They recovered, however, and put out a luxuriant new growth, and the growing period was prolonged for four weeks. Fifteen plots planted to Nova Scotia seed averaged 91.5 pounds per rod. Prince Edward Island seed (6 plots) averaged 82.6 pounds per rod. Both lots were satisfactorily free from virus diseases.

Bliss Triumph seed obtained from Prince Edward Island, planted at the same time (2 plots), averaged 54 pounds per rod.

Irish Cobbler seed from Prince Edward Island (2 plots) in the same test averaged 57 pounds per rod.

One plot of Green Mountains, from Prince Edward Island, was planted in the same experiment, and yielded only 32 pounds per rod.

Spring Planting.—Bliss Triumphs grown by L. F. Baxter, Nova Scotia, and Irish Cobblers grown by R. W. O. Chase, Nova Scotia, were planted in Rosebank field on 18th March, and dug on 13th June. The yield of the Bliss Triumphs averaged 78.8 pounds per rod, and the Irish Cobblers averaged 52.8 pounds per rod. Both lots were satisfactorily free from virus diseases.

Tests for New York College of Agriculture.—Thirty-four samples of seed potatoes were planted in North Field on 5th January. The object of the test was to obtain early readings of virus and other diseases. Dr. K. H. Fernow of Cornell University came to Bermuda to examine the test for diseases, but the Department took advantage of the opportunity to obtain information on the comparative yields of the different varieties in the test, with the following results:

Bliss Triumphs	(2 plots),	average	85	lbs.	per	rod
Irish Cobblers	(2 "),	"	66.6	"	"	"
Smooth Russets	(6 "),	"	62	"	"	"
Green Mountains	(10 "),	"	54	"	"	"
Smooth Rurals	(12 "),	"	48.6	"	"	"

Fall Planting.—Nebraska-grown Bliss Triumph seed for 1932 was grown on Long Island, New York, on contract. Dr. S. E. A. McCallan, Boyce Thompson Institute for Plant Research Inc., Yonkers, N. Y., made the field inspection on behalf of the Department. The plantings were also inspected by Dr. K. H. Fernow of Cornell University, Ithaca, N. Y. Both Dr. McCallan and Dr. Fernow reported favourably on the condition, but mentioned the presence of volunteer plants, and Dr. McCallan commented on the moderately heavy aphid infestation. The tubers were large, and clean. One barrel of Nova Scotia-grown Bliss produced by A. Eaton and one barrel from E. R. Jess were included in the test. Both the Nova Scotia lots were dipped in 4 per cent solution of ethylene chlorhydrin to hasten germination. The E. R. Jess lot was quite dormant, and did not respond to the treatment, and was eventually eliminated. The Eaton lot responded readily, and developed a vigorous growth about five days behind the Long Island stock. In view of the good field inspection report and the large size and good condition of the tubers, the presence of so high a percentage of leaf-roll, as is shown below is baffling. In the absence of any direct evidence, it might be assumed that the disease spread from the volunteer plants by insect vectors.

The field readings are given below:

Origin	Vigor	Misses	Leaf-Roll	Mosaic	Yield per rod
Long Island.....	95.5%	7.3%	23.3%	Soon	53.9%
Nova Scotia.....	94 "	13 "	2 "	Nil	60.2 "

The average of infestation observed on farms was about 48 per cent.

Onion Tests.—Eight samples of onion, 6 originating in Teneriffe, 1 from California, and 1 grown in California from bulbs specially selected in Bermuda previously, were tested. The Teneriffe varieties averaged 2 per cent crystal wax and off-colours and 2 per cent splits. The California strain averaged 2 per cent crystal wax, while the California-Bermuda bulb selection was comparatively true to type.

Thirty-four bushel crates of bulbs from this season's selection were sent to Messrs. Aggeler and Musser Seed Co., Los Angeles, California, to produce further seed.

Leguminous Green Manure.—All the experimental plots were planted to soy beans. The growing conditions were favourable, and a very heavy crop resulted; in some instances 15 tons per acre.

Live Stock.—The following animals were carried over from 1931:

Guernsey bull Montrose Hector (143022), bred in Bermuda.
" " Colchester King (7456), imported from Canada.
" " Montrose Castor (186160), bred in Bermuda.
" " Montrose Hermes (194225), bred in Bermuda.
" cow Albamont Juliet (85736), imported from U. S. A.
" " Canadian June (33080), imported from Canada.
" heifer Joy of Montrose (302700), bred in Bermuda.
" " Jean of Montrose (349649), bred in Bermuda.

The following calves were dropped during the year:

Bull calf, Montrose Prince; dam, Albamont Juliet; sire, Colchester King.

Heifer calf, Joy of Montrose; dam, Albamont Juliet; sire, Colchester King.

Heifer calf, Jane of Montrose; dam, Albamont Juliet; sire, Colchester King.

The following animals were disposed of during the year:

Bull, Colchester King, to butcher.
" Montrose Castor, to Mr. J. R. Finlay.
" Montrose Prince, to butcher.

SURVEY OF CANADIAN MARKET.

I was on duty in Canada in the capacity of Marketing Officer from 2nd to 21st March and from 21st April to 11th July. The first visit was mainly in connection with the failure of bunched carrots to arrive in Montreal in good condition.

On my second visit I made my headquarters in Montreal, and I paid visits to Halifax, Saint John, Toronto, Ottawa and Quebec.

Since considerable shipments of celery were dispatched to Canada via New York, I made two visits to that city.

MARKETING IN CANADA.

Notwithstanding the continued depression and the consequent decline in purchasing power, prices obtained during the season were in most instances satisfactory, and the returns to the growers in many instances were higher than in 1931. The conditions under which Bermuda vegetables were marketed were probably unique; the chief of these were the liberal protection afforded Bermuda vegetables by the British Preferential Tariff legislation enacted by the Dominion Government in 1929, the uniformity obtained through Government packing, the improved method of distribution secured by marketing through exclusive brokers, and last but not least, the special concessions secured by the late Hon. J. P. Hand on his mission to Ottawa and Montreal in May.

Grading and Packing.—Government packing of vegetables has considerably enhanced the value of Bermuda vegetables in Canada. Through its agency, fair uniformity of grade and pack has been obtained, but successful marketing does not end in the packing house. The most important matter directly connected with packing is pre-cooling facilities. Until such are provided, the expansion of exports to Canada must necessarily be slow and often costly, because without cold storage facilities, grading and packing cannot be carried on economically. The life of vegetables not precooled is very short, and the spoilage through decay will often more than offset the advantage of good grading and packing.

Advertising.—Through the co-operation of the Trade Development Board, a small amount of advertising was undertaken. For this purpose newspapers, radio broadcasting, window display cards and posters were used. Another method which proved effective was the marketing of washed celery wrapped in parchment paper carrying appropriate printing.

In the report of my investigations in Canada I recommended a rather ambitious advertising programme for 1933, and it is to be hoped that ways and means may be found to meet this expense.

Seed Production and Plant Propagation.—Following up the work commenced last year, additional experiments were introduced this year.

(a) Carrot stecklings from the tests at the Station were selected in February, and shipped to Canada. Arrangements were made

with Mr. T. F. Ritchie, Assistant in Vegetable Gardening, Central Experimental Farm, Ottawa, and Messrs. Dupuy & Ferguson, Montreal, to grow seed from these; Mr. Ritchie working on individual plant selection and Messrs. Dupuy & Ferguson on group selection. Both were successful in producing seed, and at the close of the year the plantings from this seed looked very promising. Further selection is contemplated.

(b) Selected onion bulbs were planted by Mr. Ritchie and Messrs. Dupuy & Ferguson to ascertain whether Bermuda onion seed can be successfully produced in Canada. This did not prove successful, but further tests will be made. The production of seed in California was continued.

(c) A small quantity of seed of the Bermuda onion was planted in Montreal on 15th June with the view of transferring the plants to Bermuda in October. It was found that 15th June was too early to sow the seed, as the plants developed bulbs too quickly.

(d) Messrs. Dupuy & Ferguson planted a considerable quantity of celery seed in Montreal from 15th June to 15th July, and the seedlings were successfully transferred to Bermuda during September and October.

COMMODITIES MARKETED AND COMMENTS THEREON.

Beans.—The quantity of beans marketed (233 bushels) was insignificant, and the average price of $1.28 per bushel obtained does not represent what could have been obtained had all shipments arrived in good condition. The farm-packed shipments sent forward were invariably too old and stringy, and in many instances they were only good for shelling purpose. The Government-packed were uniformly better, but both packs invariably showed a heated condition in the centres of the crates while the outside layers were good. I think the use of the tomato lug in place of the bushel crate will reduce loss through heating.

The wax variety is generally in demand in Upper Canada. Flat green beans can be sold to a limited extent up to the end of May, but when wax varieties become available in June the demand for green beans ceases, except at a much cheaper price. There is no such discrimination in the Maritimes, and green beans of good quality will sell readily throughout the domestic off-season. The shipping season for beans is from November to June.

Beets.—The beet shipments were small (1,369 crates), and generally unattractive on account of fireworm injury. An average price of $1.57 per crate did not represent the full value of quality beets. Much of the shipments were topless, and the bunched ones could not be classed as No. One stock. The market demands new beets about 2½ inches in diameter. Bunched beets with tops sell best in Upper Canada throughout the season, and during the early part of the season nice green tops are demanded because they are utilised as greens. The Maritimes prefer beets with tops early in the season, but the objection to beets without tops in the Maritimes is not so strong as in Montreal. The demand for beets such as we ship now is limited to about 300 crates weekly, commencing in Montreal in February and the Maritimes in April.

The present bushel crate is not suitable for beets with tops on account of insufficient length. I recommend a longer crate to obviate twisting the tops and injuring the roots when packing.

Cabbage.—The quality of the cabbage shipped this season was inferior to last year's, and the remarkably good prices received were largely due to the scarcity of supplies. We were not able to realise the full market value of good cabbage at any time during the season on account of lack of quality. The Charleston Wakefield type is favoured in most markets, and in competition with other types of equal quality sells at a premium.

Most of the cabbage shipped this season was sold in the Maritimes; even the shipments to Montreal were generally diverted to Halifax or Saint John. The Maritimes can use a considerably larger quantity than we shipped this season, but the Upper Canada markets will not absorb very much until we are able to place it there in better condition.

A loss occurred through the use of poor crate material. A considerable amount of re-packing had to be done on the docks on account of breakages, and the shrinkage on this account was quite heavy. The large size of the crate makes it difficult to handle, and some of the breakages were on this account. A smaller crate is recommended to facilitate handling and prevent breakages.

Carrots.—Conditions were favourable for carrots this season. The prices which we received for loose carrots in Montreal were remarkable, and had it not been for the rotting caused by the fungus *Sclerotinia Sclerotiorum*, the average price would have been considerably higher. High prices were largely due to scarcity of stored domestic carrots. Early in the year there was a scarcity of carrots in the United States, and large quantities of Canadian carrots were shipped there. This was fortunate for us, because it cleared the Canadian market for ours. We were further assisted by a slight freeze of the plantings in Texas and the embargo placed on California vegetables on account of the prevalence of foot-and-mouth disease there. It is possible that these favourable conditions may occur again in 1933, but it is highly improbable, and we should be prepared to meet competition.

The trade in Upper Canada is accustomed to buying new carrots bunched with tops, and the consumers take it for granted that new carrots must have green tops. Canadian winter-stored carrots are sold loose by the pound very cheaply. They are "dolled up" and made to look quite attractive. Our loose carrots are sold in much the same way, but are not "dolled up", and are considered on the same cheap basis. Unfortunately, we have not been able yet to ship bunched carrots very successfully, and until we do, we must adopt some means of marketing loose carrots which will appreciate their value. To accomplish this I have recommended that a proportion of the shipments be sold in three-pound bags.

Celery.—We were forced to market the major part of our crop in Canada on account of the unfavourable conditions in the New York market. This was the first real test of our marketing system, and it stood it well.

The quality of the celery shipped throughout the season varied considerably. The presence of blight and black-heart contributed a great deal towards depreciating its value. On arrival in Montreal I checked up on condition and selling prices with the following results: 54 per cent, good condition and pack, sold at full market value; 30 per cent, fair condition, pack fairly good but blight and black-heart depreciated value, sold at 75 per cent of full market value for good stock; 10 per cent, poor condition, mostly medium or small sizes, blight, black-heart and slack pack, sold at half price; 2 per cent, very poor condition, no sale, dumped.

The sale of celery can be expanded, but this must be gradual. Shipments must be under complete control, only first quality celery should be

sold directly off the steamer. Any crates showing any defects should be cold-stored and re-conditioned. In my report on marketing celery I recommended that the surpluses over the immediate requirements be washed, cleaned, wrapped in parchment paper and re-packed. When the market became swamped this season, this method was tried out with very good results.

Numerous complaints were received about the bruised condition of the celery. It is generally recognised that our celery is very delicate and easily injured, and after various handlings in transit the exposed portions become bruised and discoloured. The chief reason for this is that our crate offers very little protection to the most vulnerable part of the celery. A new crate has been designed to offset this condition, and I strongly recommend that it be tried next season.

An interesting development which may have far-reaching results is growing seedlings in Canada and bringing them to Bermuda for early planting. By this it is hoped to extend the season by about three months. It is too early yet to predict whether or not the scheme will be a success. During my visit to Montreal in the winter of 1931 I was able to interest Messrs. Dupuy & Ferguson in the scheme, and during 1931 and 1932 this firm co-operated with the Department, growing the plants on their farm at St. Laurent, near Montreal, and attending to the shipping, etc. Much credit is due Mr. E. W. Outerbridge, a member of the Board, who has worked independently on a similar project, and produced seedlings in the Maritimes.

Onions.—The first shipment of onions arrived in Montreal on 3rd May. It was not favourably received because too green, and within a few days after arrival the bulbs began to sprout. The shipment on 18th May was in much better condition, but on account of the unfavourable reaction to the previous shipment and competition from Egyptians, it did not sell very readily in the beginning, but as soon as the trade became accustomed to our onions, the demand increased.

Considerable overshipment of farm-packed onions was made to the Maritimes, which had to be railed to Montreal at additional expense. When shipments were in excess of the requirements of the Montreal market the excess was shipped to Toronto and as far west as Winnipeg, but these markets did not accept them readily, largely on account of their lack of keeping qualities.

It would be unwise at present to increase the output of onions to any great extent.

Potatoes.—Shipments of potatoes could have been much larger, and better prices could have been obtained had shipments been regulated. Many more potatoes can be marketed in Canada, if we cater to the Canadian demand rather than expect them to buy on our terms.

Parsley.—Our parsley is undoubtedly superior to any other marketed in Canada, but its delicate nature makes it difficult to handle without body icing. Even under present conditions shipments could be increased up to the middle of April, when the weather becomes too warm.

Spinach.—New Zealand spinach shipped during the season carried fairly well, and quite a fair market may be worked up in the Maritimes and possibly later in Montreal. The demand for spinach is from January to June, as the domestic crop cannot be cold-stored for long. The recently introduced spinach mustard, which grows quite luxuriantly and is not subject to attack by fireworms, should prove a valuable vegetable for export.

Tomatoes.—It was unfortunate that our tomato crop was late on account of unfavourable weather during the early part of the year, and that the bulk of the shipments had to be crowded in a short space of about seven weeks. The lack of frequent steamship sailings to carry regular supplies and prevent over-ripening had a very damaging effect on the market. This was particularly true of the shipment of over nine thousand crates by the Lady Somers, 22nd June, which included several thousand crates that had been packed for the S. S. Cornwallis, which failed to arrive on the scheduled date.

On the whole, our tomatoes are well liked in Canada, and many favourable comments have been made about their good flavour. On the other hand, there has been severe criticism of small sizes, and undoubtedly their inclusion has been detrimental. How to overcome this difficulty is a problem, unless it be by the selection of a variety for growing which will produce larger fruit.

Cucumbers.—Good prices may be obtained for cucumbers. Every effort should be made to make early plantings, and particular stress is laid on the need of dusting the vines with sulphur to prevent mildew.

Acknowledgment.—The thanks of the Department are due to Mr. T. F. Ritchie and Mr. R. Ferguson of Messrs. Dupuy & Ferguson for the valuable work they carried out gratis for the Department, and I wish to record my deep appreciation to them for their assistance to me personally.

Respectfully submitted,

W. R. EVANS,
Agricultural Assistant.

1st February, 1933.

Report of the Inspector of Produce, 1932.

The Director of Agriculture.

I have the honour to submit my report for the year 1932.

INSPECTION OF SEED POTATOES.

Triumphs.—Imported from Nebraska 175 bags (120 lbs. each) for March planting, and to be replanted for early Fall crop; from Long Island and Canada, 4,365 barrels for main Fall crop. The seed was in sound condition when inspected.

Garnets.—From Nova Scotia 2,771 barrels.

Cobblers.—From Nova Scotia 975 bags (120 lbs. each) and 781 barrels. The seed was in sound condition, and importations were much larger than last year's.

INSPECTION OF PRODUCE.

Quantities Shipped.—See Director's report.

The following comments are made on the various vegetables shipped.

Beans were fairly good; some too old.

Beets were good, except at end of season.

Carrots.—The quality was very good, but the shape was poor in some varieties.

Celery.—The crop showed much improvement over last year's, although in some sections it was a total loss because of blight. Black-heart was very little observed.

Onions.—The quality was very good, one of the best crops grown in years; more attention should be given to proper curing.

Parsley was fairly good. Parsley should be transplanted, and better results would be obtained.

Cucumbers were good, but more care should be taken in picking, for some offered were old and sun-baked.

Cabbage.—The quality was good until the last part of the season, when rot was observed.

Tomatoes showed much improvement over those of last year. Not more than one variety should be grown.

Potatoes.—The quality of Triumphs was fairly good, while quantity was small. Garnets cropped heavily, and Cobblers fairly well.

Produce Rejected.—The following produce was rejected on first inspection. Some of it was passed when inspected the second time after corrections had been made in it:

Beets	15	crates
Cabbage	75	"
Carrots	488	"
Celery	853	"
Onions	33	"
Potatoes	300	barrels
Tomatoes	25	crates
Total	1,487	packages

or 1.8 per cent of total of farm pack.

RECOMMENDATIONS.

1. That meetings be held in agricultural parishes to give the farmers instruction in growing crops.

2. That the smallest size of tomatoes now being shipped be discontinued; likewise, No. 3 potatoes.

3. That the celery crate be improved.

4. That a man be placed at the dock to receive Government-packed produce.

5. That an Inspector frequently visit farms throughout the season. This would help the farmers and encourage them.

APPEALS.

None.

PROSECUTIONS.

None.

SUPERVISION OF CHILL-ROOMS.

Throughout the season the chill-rooms on the steamers were frequently inspected by Sub-Inspectors J. W. M. Gibbons and myself, and I have the satisfaction of reporting that the stowage was good at all times. Breakage of crates was much less than in any former season, due in large measure to the improved crates.

ACKNOWLEDGMENT.

I wish to record my personal appreciation of the assistance of the Wharfingers, the Dock Pursers and the officers of the different steamers engaged in the carrying of crops.

INSPECTION OF CRATE MATERIAL.

All crate material was inspected at the time of importation. The material was of good quality, with the exception of two lots which were condemned as not fit for use. Barrel material was of good quality.

INSPECTION OF LILY BULBS.

Bulb inspection began on 12th July and continued at the different packing sheds until the early part of September. The bulbs were good, and the crop was larger than last year's. The percentage of what are locally called "blind" bulbs was very much below that of last year's crop. Basal rot was less. The field inspection by the Plant Pathologist rendered much easier my inspection at shipping time. I inspected and passed 3,009 cases.

FARMERS' MARKET.

A varied lot of produce was offered for sale, and five stalls were occupied and generally well filled with produce. The vendors appeared to be well satisfied with their sales on the whole. Some prices for vegetables appeared to me to be very high.

OTHER WORK.

I supervised and helped to erect the addition to the Packing House at the Station from early July to November, when my duty at the dock began. At intervals I paid visits to the work.

Respectfully submitted,

E. L. ADAMS,

Inspector of Produce.

1st January, 1933.

Report of The Horticulturist, 1932.

The Director of Agriculture,

I have the honour to submit my report for the year 1932.

STATION GROUNDS, PLANT HOUSES, ETC.

Grounds.—The grounds were maintained as economically as practicable. The planting of miscellaneous plants, minor alterations to lawns, flower beds, etc., completion of shrubbery along the Packing House driveway, extension of the succulent garden, grading of a portion of land immediately south of the Citrus orchard following the removal of the old house and the felling of one dozen *Citharexylum quadrangulare*, which formed a part of a wind screen, and the preparation of a new slat-house site, were all executed.

Plant-Houses.—These were in an overcrowded condition throughout the year. Besides the slat-house, four of the glass-houses were used exclusively for the housing of young plants, and this left little room for show purposes. A sheltered piece of adjoining land was used to stand established plants. The encroachment of tree roots into the fernery necessitated its reconditioning.

Nursery.—The whole of Rosebank plot was taken over as a nursery and trial ground.

Orchard.—No special attention was given to this, other than periodical dry mulching and spraying. A medium crop of good quality fruits, chiefly Citrus, was gathered. Papaws of good size and exceptionally fine flavour were grown from seeds imported from the West Coast of Africa.

Propagation of Plants.—There was only a slight increase in the stock of young plants over that of last year. It was found necessary to cut down on propagation, and only grow such plants as will be required for future Station planting and Arbor Society work, on account of insufficient housing accommodation and labour to cope with the extra work that would be involved.

TRIALS.

Sweet Potato *(Ipomoea Batatas varieties)*.—Twenty-three varieties were given trial to ascertain the best varieties under local conditions, taking into consideration shape and size of tubers, flavour and colour of flesh, crop and possible export marketing qualities. Ten of the varieties were received from the U. S. S. R. Institute of Plant Industry, Leningrad, and the remainder, nine of them seedlings, from Mr. H. E. D. Smith of St. Davids Island.

As a result of the first trial, two varieties were selected for further trial and observation:

(a) A red-skinned, globular-shaped variety with butter-yellow coloured, firm, sweet flesh; yielding a medium to heavy crop of medium-sized tubers. A Smith seedling.

(b) A light brown or amber-skinned, conate-shaped variety with creamy-coloured, mealy, medium firm and sweet flesh; yielding a heavy crop of uniform-sized tubers. A Russian variety.

Lily *(Lilium longiflorum varieties)*.—The trial of various *Lilium longiflorum* varieties, begun last year with the ultimate view of improving

the strain of the Bermuda variety, *eximium*, and possibly evolving a hardier, better forcing and shipping type to meet the requirements of the retail growers, was continued. Seventeen varieties, strains and bulbs of crosses made last year were planted, and *Formosum*, *Takesima*, *Erabu* and *Nobilis* were included.

Miscellaneous Bulbs.—Experiments with bulbs which promise future marketing possibilities were begun, and included: Hippeastrum, Hyacinthus (Roman type) Freesias, etc.

PLANT DISTRIBUTION.

Numerous trees, palms and shrubs, as well as other plants, for the planting of properties bordering on the road side, railway stations and parks were distributed to the Pembroke Arbor Society, Somerset, Southampton Garden Clubs, Biological Station, King Edward VII Memorial Hospital, and Corporation of Hamilton. In addition, presentations were made to bazaars, and many plants were sold at nominal prices.

SEED AND PLANT EXCHANGE.

It was found impracticable to issue a seed exchange list. The Department is greatly indebted to the Directors and Superintendents of the undermentioned Stations and Institutes, and to private contributors for their continued contributions:

British.—Departments of Agriculture: Queensland, Australia; Aburi, The Gold Coast; Kampah, Uganda Protectorate.

Botanic Gardens, etc.: John Innes Institute, Merton Park, England; Kew, Surrey, England; Dublin, Irish Free States: Edinburgh and Glasgow, Scotland.

Foreign.—The United States Department of Agriculture, Washington, D.C.

Botanic Gardens, etc.: Copenhagen, Denmark; Tartu, Estonia; Montpellier and Paris, France; Berlin, Germany; Amsterdam, Holland; La Motrola, Ventimiglia, Italy; Kaunas, Lithuania; Warsaw, Poland; Coimbra, Portugal; Bucharest, Roumania; Leningrad, U. S. Russia; Basil, Switzerland.

Private.—Prof. Juan Balme, Mexico City, Mexico; Mr. H. E. D. Smith, St. Davids; Bermudiana Hotel; Tuckers Town Development Company.

HERBARIUM.

No work other than the determining of specimens sent in for identification was practicable.

EXHIBITIONS.

Display exhibits of miscellaneous local-grown vegetables were arranged at the Station on the occasions of the Empire Parliamentary Delegation, the Canadian Trade Cruise and the Annual Agricultural Exhibition, and of trees and shrubs, together with models and descriptive diagrams of the various methods of propagation, at the Somerset Flower Show.

GENERAL GARDEN AND PLANT SURVEY.

A decided improvement was observed in the maintenance of gardens throughout the Colony, especially those bordering the road sides. The tendency to grow more perennial plants, such as flowering shrubs and trees, was noticeable.

Ideal growing weather conditions and lack of harmful winds throughout the summer months were mainly responsible for the heavy luxuriant growth of all plants.

Fruit crops on the whole were good. Fair crops of Avocados were noted for the first time for many years.

VICTORIA PARK.

Victoria Park, Hamilton, was re-constructed and conditioned according to plans submitted, by request, to the Corporation Parks Committee.

The work consisted of remodelling the whole, with a view to enlarging the band-stand enclosure, and giving better access and a more harmonizing layout of flower beds, shrubberies and pathways in relation to trees, palms and buildings. This entailed the construction of some six thousand square feet of new pathway, seven thousand square feet of turfing, the abolition of all existing flower beds and the construction of new flower beds and shrubberies.

SMITHS AND HAMILTON PARISHES GARDEN COMPETITION.

Mrs. J. J. Storrow, Tuckers Town, very generously offered certificates to owners of cottage gardens in the Parishes of Smiths and Hamilton who show commendable improvement in their gardens during the period from October, 1932, to April, 1933.

Mrs. A. B. Smith and Mr. John J. Bushell, M.B.E., kindly consented to associate themselves with me in judging the gardens.

OTHER ACTIVITIES.

Plans, to scale, of all construction work undertaken at the Station, of packing house and chill-room facilities at the Hamilton docks, and of Victoria Park were prepared.

Secretarial work of the Garden Club of Bermuda was continued at His Excellency's pleasure. The meetings of various other Garden Clubs and kindred societies were frequently attended, and advice on plants and planting given.

RECOMMENDATION.

It is recommended that a parcel of land in the Paynters Vale or Walsingham district be reserved with the object of forming a plant reserve, so that the old plant beauties of these Islands shall not be lost, and also to provide a recreational, historical and scientifically educational park as well. This would, I am sure, be of great benefit to the Colony, and would be of interest outside Bermuda.

Respectfully submitted,

J. C. NAUEN,

Horticulturist.

25th January, 1933.

Report of the Veterinary Officer, 1932.

The Director of Agriculture,

I have the honour to submit my report for the year 1932.

Local Outbreaks of Infectious Diseases.—In January an outbreak of hog cholera occurred on the farm of Mr. Napoleon Anderson, Harrington Sound. The premises were in quarantine from January to March. Forty-three pigs died out of a total of 53. The disease did not spread, and no outbreak occurred elsewhere.

A case of Purpura hemorrhagica was reported in Devonshire by Dr. E. S. Browne.

In January, when inspecting the coolers of Messrs. Pearman, Watlington and Co., two carcases of pigs showed measles, on examination; the carcases were condemned and buried in my presence. I later visited Radnor Farm, Crawl, from which the pigs came, and examined the herd, which showed no symptoms of measles. I considered it advisable, however, to delay slaughtering for a short time, but carcases slaughtered eventuallly showed no signs of measles.

Importation of Animals.—The following domestic live stock were imported:

Horses	84
Dairy cattle	79
Pigs	56
Poultry	4,995
Dogs	198
Miscellaneous	51

Dairy cattle increased by 12 over previous year's importations, poultry (chiefly small chickens) increased largely, and all other kinds of live stock decreased.

All imported pigs were vaccinated against hog cholera. All other animals not accompanied by proper certificates were treated according to the requirements of the Bye-Laws.

Imported parrots were carefully inspected on account of the dread disease of Psittacosis or parrot fever.

Visits of Inspection.—During the year I paid 312 visits of inspection to animal quarters on vessels, and 251 visits to different parts of the Islands to inspect coolers, to inoculate animals in relation to licenses to sell milk, and for other official purposes. Of 874 dairy cattle tested for tuberculosis, 8 reacted, and were destroyed according to the Board's Bye-Laws. The tuberculin tests and examinations for milk licenses were made for the General Board of Halth.

Condition of Dairy Stock.—The general condition and breeding of the cattle in the larger dairies continue to improve, but the same can not be said of all the animals in the smaller dairies, and privately owned. With respect to bulls, I am pleased to report that but one or two scrub animals remain.

Farmers' Market.—The Market was visited weekly. The general sanitary conditions of the stalls were maintained in but fair condition. The quality of the beef was fair until March, but has fallen since then. Pork continues to be of good quality. The premises on which animals are slaughtered for sale in the Market are in sanitary condition.

Private Markets.—The coolers of the various private markets were inspected frequently, and conditions, on the whole, were satisfactory. Messrs. Pearman, Watlington and Co. made extensive and modern additions to their coolers and slaughter houses.

Agricultural Exhibition.—The exhibit of horses at the Thirteenth Annual Agricultural Exhibition was particularly good, as were dogs. Poultry was very good in both quality and quantity. Cattle was scarcely as good as in the previous year. Exhibits of pigs were very small, as usual.

Issue of Pharmaceutical Material.—No material was issued during the year.

Cruelty to Animals Cases.—Professional evidence was given in five cases prosecuted by the Police Department.

Fees.—The following fees, approved by the Board on 10th March, 1931, were charged for services performed in my official capacity.

(a) Tuberculin tests of imported cows:

1 cow	forty shillings	of same owner
2 cows	sixty shillings	
3 cows	seventy shillings	
more than 3 cows	ten shillings each additional	

(b) Ophthalmic test of imported horses:

1 horse	twenty shillings	of same owner
2 horses	thirty shillings	
more than 2 horses	five shillings each additional	

(c) Anti-hog cholera vaccination of imported pigs:

Initial fee of ten shillings, and one shilling and six pence per pig.

Over twenty pigs of same owner—no initial fee charged.

Respectfully submitted,

C. J. COOPER,

Government Veterinary Officer.

7th January, 1933.

APPENDIX A.

Report on the Bermuda Bulb Trade in Great Britain, 1932.

Trade Conditions.—In reviewing the events of the past twelve months, it is impossible to avoid making a brief reference to general trade conditions. As a result of the drastic measures taken, the national credit has been safeguarded, and it is generally agreed that the position is sound in essentials. On the other hand, individuals and firms engaged in many kinds of business are still faced with great difficulties, not the least being the burden of high taxation. However, when all is said, the country has managed to get round several awkward corners, and in some directions, there have recently been signs which give ground for the hope that before long trade will begin to improve.

Sales.—In these circumstances, it is not surprising that many customers were at first inclined to be dubious of the prospects; however, as the season advanced, their attitude gradually reflected the increased confidence of the public; and, in the end, the sales reached almost exactly the same total as in 1931.

It would, however, be a mistake to infer that the business has run on precisely the same lines, and that it has not been affected by the times. Many of the large private growers have either closed down altogether, or turned over their plant to the growing of tomatoes and similar produce. The loss of such orders was inevitable, and it is satisfactory that it has been made up by an increase in other directions. The new business is mainly attributable to the growing reputation of Bermuda produce, aided by the present feeling in favour of Empire goods. The tariff advantage was also a factor; but perhaps hardly so important, because the preference is not very great, and there was at one time some uncertainty whether it was to be permanent or temporary. It is, therefore, justifiable to say that definite progress has been made in the directions in which it was possible, and that the total sales of the year would undoubtedly have shown an increase under less abnormal conditions.

It is unnecessary to repeat in detail all that has already been said about the Florists' business. Market Growers are individually, and as a class, the largest buyers of lily bulbs; therefore, much is to be hoped for from the efforts of your experts, and of the growers, to produce a flower of tougher texture.

Prices.—On an average, the selling prices were 2/6 below those of last year. The price relation between the two main sizes was altered, with the effect that the 9—11's were not reduced as much as the 7—9's. We consider that this change worked well, and recommend that it should be continued.

1931 Bulbs.—Customers reported satisfactory results.

1932 Bulbs.—An exceptionally fine-looking crop. If their performance is as good as their appearance, they should give complete satisfaction.

Grading and Packing.—Apart from a few cases which arrived in a very bad state, shipments were good in these respects. We think the grading is more exact than it was a few years ago. There seems to be more enquiry for an intermediate size of 8—10 inches; and a few of the most particular buyers stipulate for grading in single inches. Here and there, a little more care might with advantage be taken to see that the boxes are

tightly fitted together; the sand slips through the tiniest gap, and damage to the bulbs is the invariable result.

Shipping.—This year all the shipments came by the P. S. N. route, which offers several advantages. In the first place, there is no transhipment, and consequently the risk of damage is minimised. Secondly, the voyage is quicker. There is, however, the drawback of the long interval between the boats, and it may easily happen that one is not available just at the date it is wanted. It would be a great mistake to hold shipments back for any length of time, because it entirely discounts the natural advantage of the early crop. It is important that shipments should reach customers well in advance of the Japanese Formosum; in fact, we go so far as to say that being first in the market is worth at least ten shillings per case. Liverpool is not as good a centre for distribution as London; it involves an amount of expense for railway carriage, some of which cannot be passed on to buyers. Despite this, we believe that the P. S. N. route works out a trifle cheaper, owing to the lower steamer freight; but on balance there cannot be much difference in the expense.

With these qualifications, we agree that it is the best route available.

Exhibits.—The usual display was made in Hyde Park, and attracted very favourable comment. The Kew plants were of outstanding merit; in fact, we have never seen a better lot.

Advertising.—The largest item was the leaflet. Thirty thousand copies were distributed through the leading retail seedsmen to suitable private customers. Apart from the printing, it costs nothing.

Advertising in the Gardening Press was kept to a minimum. When circumstances permit, it might be increased on suitable occasions.

We should like, once again, to express appreciation of the help given by Mr. Burn in these matters. His prize scheme for Horticultural Societies is also a very valuable means of popularising the bulbs, and it has led to enquiries where supplies could be bought.

Lily Conference, 1933.—It is thirty years since the Royal Horticultural Society has held a conference devoted to lilies, and everyone interested in them is looking forward with keen interest to the 11th, 12th and 13th July, 1933. The arrangements include a show in the Society's hall; and all the leading firms, as well as many distinguished amateur growers, will spare no pains to make it an outstanding occasion. It is unnecessary to dwell on the commercial advantages of this unique opportunity for showing Bermuda lilies, because they are obvious. We are sure the Board will be pleased to know that the prospect of an official Bermuda exhibit has given great gratification to the eminent horticulturists responsible for the organisation of the Conference. In fact (as one of them said), the show could not be regarded as complete without it.

A very fine lot of selected bulbs is in the hands of a grower of great skill and experience, and every possible care will be taken to ensure a display which will be a credit to the Colony.

Roman Hyacinths.—Trade buyers commented very favourably upon the sample bulbs. Tests are in progress; and in the event of good flowering results being obtained, we do not anticipate any difficulty in selling all that are available next year. The prices will depend upon the rates asked by Continental producers; there is no reason to expect that they will be other than remunerative.

Freesias.—Samples are now being tested. In this case the low prices of European bulbs may be an obstacle.

London, 17th Nov., 1932. ROBERT TUCKER AND CO.

APPENDIX B.

ANALYSIS OF BERMUDA SOILS.

MADE BY IMPERIAL INSTITUTE (LONDON), 17TH APRIL, 1931.

	Sample C. 2. Calcareous, light reddish brown.		Sample D. 1. Highly calcareous, light brown.	
Preliminary Mechanical Analysis.				
Stones and gravel	4.2%		6.1%	
Fine earth, 2 mm. and under	95.8%		93.9	
Mechanical Analysis of Fine Earth.	Total of fraction dried at 105° C	$CaCO_3$	Total of fraction dried at 105° C.	$CaCO_3$
Coarse sand, 2 to .2 mm.	25.0%	20.7%	51.3%	48.4%
Fine sand, .2 to .02 mm.	11.6	7.1	11.4	10.2
Silt .02 to .002 mm.	28.0	4.5	16.1	7.5
Clay, .002 mm. and under	21.8	1.6	11.5	3.2
Moisture at 105° C.	7.96		4.75	
Matter soluble in water	0.07		0.09	
Calcium carbonate dissolved	3.7	3.7	4.0	4.0
	Total 98.13	37.6	99.14	69.3
Calcium carbonate	(total) 36.5%		72.0%	
Loss on ignition	13.28%		6.29%	

Chemical Analysis of Fine Earth	Soluble in hydrochloric acid	
	Sample C. 2	Sample D. 1
Lime, CaO	20.95%	38.97%
Magnesia, MgO	1.06	1.27
Potash, K_2O	0.17	0.12
Soda, Na_2O	0.11	0.18
Ferric oxide, Fe_2O_3	5.95	2.32
Alumina, Al_2O_3	11.89	4.24
Manganous oxide, MnO	0.11	0.08
Phosphoric acid, P_2O_5	0.89	0.95
Nitrogen, N	0.40%	0.24%
Organic carbon, C	4.01	2.39
Organic matter	7.29	4.35
Carbon dioxide, CO_2	16.06	31.70

REMARKS ON SOIL C 2.

The soil is highly calcareous, and the reaction is alkaline. As regards chemical composition, the acid soluble lime is high, both in amount and in proportion to the acid-soluble magnesia. The quantities of potash, both acid-soluble and exchangeable, and of acid-soluble phosphoric acid, are rather low. There is a small amount of acid-soluble manganese present, but the quantity of exchangeable manganese is negligible. The amount of nitrogen and of organic matter is high.

REMARKS ON SOIL D. 1.

This soil is very highly calcareous. The moisture retained by the air-dry soil is low in amount, and soluble salts are not present in any quantity. The soil has an alkaline reaction, and the variation between the reaction of the aqueous and the potassium chloride suspension is small. The acid-soluble lime is high in amount, while the magnesia is low. The proportions of "exchangeable" lime and magnesia, however, do not differ to the same extent. The amounts of potash, both acid-soluble and "exchangeable", are rather low. There are fair quantities of acid-soluble ferric oxide and alumina, while the acid-soluble phosphoric acid is high. There is a small amount of acid-soluble manganese, but this element could not be detected in the exchangeable form. The quantities of nitrogen and of organic matter are high, but the ratio of carbon to nitrogen is about normal.

APPENDIX C.

Report of the Plant Pathologist, 1931.

The Director of Agriculture,

I have the honour to submit my report for the year 1931, covering the period from 1st January to the time of my departure.

RECORD OF MOVEMENTS, ETC.

I acted as Officer-in-Charge of the Department during your absence from the Colony from 2nd January to 16th January.

PALMETTO SCALE.

In January a further infestation of the palmetto scale (*Comstockiella sabalis*) was found on native palmettos (*Sabal blackburnianum*) growing at Flatts Village. Practically all of that fine row of trees at the foot of the hill were found to be infected. While the infestation was very heavy in the case of a few of the trees, they did not show any sign of serious injury.

These trees were immediately sprayed with lime-sulphur in order to check it as far as possible, and to lessen the danger of its spreading further. Spraying is effective where the scale can be gotten at, but it is impossible to entirely eradicate this insect by spraying, owing to the fact that the scale is usually abundant at the base of the leaves and other inaccessible places.

It seems inevitable that in time this scale will spread to all of the palmettos in the Colony. For a considerable time after it was first discovered on St. Davids Island it was confined to that area. Later it was found at St. Georges. In 1928 an outbreak was discovered at Shelly Bay some miles west of St. Georges, and now it has reached the Flatts, which, as far as is known at present, is the limit of its spread westward.

The one bright spot in the picture is that the scale is parasitised. Whether the parasite is one which was introduced during recent years or one which has long been established has not yet been determined. In any case, the parasite seems to be gaining ground. Trees on St. Davids Island, which were badly infested in 1928, are now practically clean, and are doing well. The same may be said of trees growing at Shelly Bay.

While further spread of the scale seems to be inevitable, the parasite, under normal conditions, should be effective in keeping it under control sufficiently well to prevent the destruction of the native palmetto.

SCALE ON THE NATIVE CEDAR.

Two rather severe outbreaks of the scale insect, recently identified as *Chrysomphalus agavis*, attacking the native cedar, *Juniperus bermudiana*, have occurred during the early part of the year; one on land belonging to Warwick Academy, Warwick, and the other on Hinson's Island. In the case of the Warwick infestation, there was ample evidence of parasitism, as was also the case where the scale was first discovered at Tuckers Town. Repeated efforts were made to breed out this parasite, but with little success until very recently.

Material recently collected at both Tuckers Town and Warwick yielded two hymenopterous parasites, namely *Aphelinus diaspidis* Havard

and *Aspidiotiphagus citrinus* (Crawford), which were identified for the Department by the Bureau of Entomology, Washington. The parasites were fairly abundant and active in the material collected.

I am of the opinion that this scale insect has been present in the Colony for a long period, and owing to its inconspicuousness was overlooked. In all probability, it has been kept under control by the parasite. From some unknown reason, the parasite became inactive in certain localities, and as a result the scale multiplied rapidly, and was sufficiently numerous to become destructive. Such occurrences are not uncommon in biological control, and are well illustrated in the frequent severe outbreaks of oleander scale in Bermuda. If sufficient time is allowed, the parasite again gains the upper hand, and the danger is removed. I feel confident that no alarm need be felt as far as the scale on the native cedar is concerned. Given time, the parasite will control these sporadic outbreaks.

INSPECTION OF LILY FIELDS.

The first inspection of lily fields commenced on 2nd February, and was completed on 12th February. The second inspection was commenced on 5th March, and was completed on 14th March. The majority of the fields were up to the standard at the time of the second inspection.

The season was not at all a favourable one for the lily grower. The rainfall from December to February was abnormally high, and the temperatures were somewhat lower than normal. Under these conditions, lilies did not make as vigorous growth as usual.

EXPERIMENTAL WORK.

The experiment carried on in connection with the "chlorosis" of lilies gave some interesting results. For the purposes of this experiment, the land was divided into sixteen plots. In September, 1930, the land was prepared for planting, and just previous to planting out the bulbs inoculated sulphur was applied at the rate of 200, 400, and 600 pounds per acre. Four plots were treated at each of the rates given, and four plots were left untreated. Shortly after the plants emerged a chlorotic condition of many of the plants was apparent. Readings were taken from time to time up to the latter part of December, when it became apparent that the chlorotic condition was less noticeable and the plants were assuming their normal green appearance.

For certain reasons it was necessary to discard the readings taken on one-half of the plot. A study of the results from the other half of the plot, however, showed that where no sulphur had been applied, 53 per cent of the plants showed chlorotic symptoms; where 200 pounds of inoculated sulphur was applied, 23 per cent of the plants showed chlorotic symptoms; where 400 pounds of inoculated sulphur was applied, 16 per cent of the plants showed chlorotic symptoms; while where 600 pounds of inoculated sulphur was applied, the number of chlorotic plants was only 7 per cent.

Not only were these results very striking as seen in the field, but the demarcation between the treated and untreated plots was clear cut in most cases.

Later on, samples of soil were taken from these plots, and tests were made of the pH of the soil solution. The results of these tests are not very striking, and possibly are not significant, but there was a lowering of the pH value with the application of sulphur, and up to 400 pounds of sulphur per acre—the lowering of the pH was consistent with the amount of sulphur applied.

Certain fertilizer experiments were carried on at the same time with the sulphur treatments. As the bulbs have not been harvested, the results of this work are not yet available.

In view of the prevalence of bulb mites in Bermuda lily fields, some preliminary work was done in the treatment of lily bulbs with hot water in an effort to control this pest. The preliminary work consisted in treating infested bulbs at various temperatures ranging from 104° F. to 126° F. for a period of thirty minutes.

It is interesting to note that for a period of thirty minutes a temperature of 119° F. did not seriously affect the vitality of the bulbs. Temperatures below 111° F. did not control the mites when they were immersed for a thirty minute period. Somewhere between the temperatures given lies the optimum temperature for control and is within the limits of safety to the bulb. Further work along this line may possibly show that lower temperatures with longer period of immersion will give more satisfactory results.

CONCLUSION.

In this final report I wish to express my sincere regret at severing my connection with the Department, and to thank you for many personal kindnesses and kindly advice. The work of the Plant Pathologist is an important one in the Colony. No matter what the future of general agriculture may be in Bermuda, there are a multitude of problems in connection with ornamental plants ever facing the Pathologist, problems which are apparently important in view of the rapid development of Bermuda as a tourist resort, but problems which require careful study ere they are satisfactorily solved. I trust that every opportunity will be given to my successor to carry on research work.

Respectfully submitted,

H. S. CUNNINGHAM,

Plant Pathologist.

27th May, 1931.

APPENDIX D.

Report of Agricultural Exhibition Executive Committee.

Hamilton, Bermuda,

3rd May, 1932.

The Clerk,

Board of Agriculture.

The undersigned members of the Executive Committee of the Thirteenth Annual Agricultural Exhibition have the honour to submit the following for the early consideration of the Board of Agriculture.

2. In the first place we compliment the Board and Department of Agriculture for the excellence of this year's Exhibition, which, in our opinion, reflects much credit on those responsible for it.

3. In our opinion, the Exhibition is an institution which is highly beneficial to the community. We desire particularly to mention that more than 1,800 exhibitors, the larger part of whom were children, took part in this year's Exhibition.

4. It is evident to all interested in the Exhibition that more permanent buildings are required, as well as improvements in other Exhibition accommodation. In our opinion, the Exhibition should no longer be required to adapt itself to the inadequate accommodation now provided for it.

5. At our request the Director of Agriculture has prepared the attached report on the additional accommodation required, and the order in which it should be provided. We beg that the Board of Agriculture will immediately make application for the sum required to construct the work set down in Section 1 of the Director's report.

J. F. CHENEVIX TRENCH, Major
Acting Chairman

A. C. BENEVIDES,
R. C. CRAWFORD,
EDMUND GIBBONS,
A. J. GORHAM.

From the Director of Agriculture,

To the Executive Committee of

Thirteenth Annual Agricultural Exhibition.

At your request I have prepared the following report on the buildings and other accommodation required for the Annual Agricultural Exhibition.

2. The Exhibition has long since out-grown the existing accommodation. This year the need for more buildings was more urgent than ever before, because, aside from the increase in the number of exhibits, no part of Montrose House was available except one room.Three rooms in the Packing House were used, but all were too small for the purposes to which they were put, and it was only because the weather was fair on 13th, 14th and 15th April that it was possible to pack vegetables out of doors; this risk should not be taken again. Further, the Packing House is too far from other Exhibition buildings to be convenient for Exhibition purposes.

3. In order to provide the required buildings at the minimum cost, I have, at your suggestion, spread the building of them over a period of three years, and it is proposed to erect them largely with Station and prisoner labour, and in the summer, if practicable. To further economise, it is recommended that very cheap forms of construction be used, for exhibition buildings are likely to become unsuitable for their purposes before they decay. Buildings have been recommended which can be used for other purposes when not required for Exhibition purposes. It is proposed to import much of the material required.

4. Attached will be found descriptions of the buildings, and the purposes for which it is proposed they will be used.

5. If money can be provided at once, it will be possible to proceed with the work this summer. On the other hand, if the money is not granted until the close of the year, the construction of the buildings will have to take place during the time when the Station staff is engaged in packing vegetables and other very important work.

E. A. McCALLAN,
Director of Agriculture.

Agricultural Station,
2nd May, 1932.

MEMO RE EXHIBITION REQUIREMENTS.

I. PREVIOUS TO 1933 EXHIBITION.

1. **Provisions for Vegetables and Flowers.**—Build a slat-house, approximately one hundred feet long by fifty feet wide. Concrete curbing, cedar framing for benches (have cedar in stock), spruce posts stepped on cedar footings, spruce framing and slats; wood-work to be treated with preservative.

When in use for Exhibition purposes the roof to be covered with light tarpaulins. When not in use for Exhibition purposes to be used for the propagation of plants. To be erected on the site of the bull paddocks. Estimated cost, £400.

2. **Provision for Poultry and Rabbits**—To provide space for arts and crafts and food products, use the existing poultry building for this purpose, as it is near the building used for arts and crafts, and erect a new building for poultry and rabbits near the existing Exhibition stables. Size of building, seventy-five feet long by thirty-two feet wide. To be built of spruce framing with galvanised iron roof and sides; glazed windows, and concrete floor.

To be used for feed-room, storage of crate material and packing vegetables when not in use for Exhibition purposes. Estimated cost, £800.

3. **Improvements to Ring.**—Add twenty feet to width on east side, take twenty feet off south and to provide more space for road here, and level sufficient of the centre to provide a suitable space for tug-of-war competitions. Estimated cost, £75.

4. **New Bull Pens.**—Erect new bull pens south of new poultry building. Use same posts and fence wire. Build two wooden sheds with double boarding; size eighteen feet long by twelve feet wide. Estimated cost, £75.

II. PREVIOUS TO 1934 EXHIBITION.

1. **Additional Space for Arts and Crafts and Food Products.**—Add twenty-five feet to the north end of present arts and crafts building, and a lean-to on west side about seventy-five feet long and fourteen feet wide. Use concrete blocks made by prisoners. Add twenty-five feet to the south end of present poultry building. Use Health Department's tank as water tank. Estimated cost, £800.*

2. **Provision for Horses, Cattle and Dogs.**—On the site of the present Exhibition horse-stalls erect a better building with alley-way between the stalls. Spruce posts stepped on cedar, spruce framing, galvanised iron roof. (Use existing roof.) Put concrete floor on eight stalls on the west side for use of Station cattle. Take down old cattle stables, and move manure pit. Estimated cost, £400.*

3. **Exhibition Office.**—Build an office (where shown on plan); size twenty-four feet long and fourteen feet wide; wooden framing, siding and floor; galvanised iron roof; movable counter.

*N.B. These estimates should be revised later.

To be used at other times for Board and other meetings. Estimated cost, £250.*

4. **Service Road.**—Construct a service road where marked on plan. Estimated cost, £100.

5. **Completion of Ring.**—Complete the grading of the Ring. Estimated cost, £100. *

III. PREVIOUS TO 1935 EXHIBITION.

1. **Grand Stand.**—Terrace the area on west side of ring. Provide better stand for His Excellency the Governor.

2. **Grading of Lawns, etc.**—Grade various places, i.e., near small Ring, north of large Ring, and so on.

3. **Sanitary Arrangements.**—Provide better sanitary arrangements.

4. **Enclosure Fences and Signs.**—Provide new enclosure fences and better signs.

5. **Enlarge Accommodation for Poultry and Rabbits.**—Build two lean-to sheds against sides of (new) Poultry and Rabbit Building.

6. **New Road.**—Construct a new road from cedar gate leading eastward to Montrose east gate. An easement across Hospital lands will be necessary.

7. **Water Tanks.**—Increased tankage is needed on this part of the Station grounds, not alone for Exhibition purposes, but for general Station purposes.

The Department of Public Works has had under consideration the construction of a large tank. If is not built before 1934, its construction should be included in this estimate.

Estimated Cost.—It is impracticable to estimate closely for work to be executed in 1934 and 1935, but the cost of the above work, exclusive of tank should not exceed £1,500.

RECAPITULATION OF COSTS.

I. **In 1932.**

Slat House	£400	
Poultry House	800	
Ring	75	
Bull pens	75	£1,350
Carried Forward		£1,350

*N.B. These estimates should be revised later.

Brought Forward		£1,350

II. In 1933.

Arts & Crafts, etc.	800	
Horses, etc.	400	
Office	250	
Road	100	
Ring (completion of)	100	1,650

III. In 1934.

Total work (exclusive of tank)	1,500
	£4,500

E. A. McCALLAN,

Director of Agriculture.

2nd May, 1932.

APPENDIX E.

DISPOSAL OF PRODUCE.

Milk to King Edward VII Memorial Hospital	£100	19	0
Vegetables to King Edward VII Memorial Hospital	29	13	8
Vegetables to other institutions	10	6	0
	£140	18	8

RAINFALL RECORDED AT AGRICULTURAL STATION.

January	1.50	inches
February	2.76	"
March	6.45	"
April	3.08	"
May	2.55	"
June	3.74	"
July	6.93	"
August	5.78	"
September	3.18	"
October	5.13	"
November	11.10	"
December	1.12	"
Total	53.32	inches

C. V. S. EARLY,

Station Foreman.

14th Jan., 1933.

APPENDIX F.

FINANCIAL STATEMENTS.

(a) EXPENDITURE (EXCLUSIVE OF SALARIES) FOR THE YEAR ENDED 31st DECEMBER, 1932.

Personal Emoluments

FEES TO MEMBERS OF BOARD

Appropriated by Act No. 50 of 1931		£ 70 0 0
Paid to members for attendance	£ 58 8 0	
Unexpended balance	11 12 0	
	£ 70 0 0	£ 70 0 0

RENT ALLOWANCE TO PLANT PATHOLOGIST.

Appropriated by Act No. 50 of 1931		£100 0 0
Paid to Plant Pathologist	£100 0 0	
	£100 0 0	£100 0 0

ASSISTANT INSPECTOR OF PRODUCE.

Appropriated by Act No. 50 of 1931		£175 0 0
Paid in monthly wages	£175 0 0	
	£175 0 0	£175 0 0

SUB-INSPECTORS OF PRODUCE.

Appropriated by Act No. 50 of 1931		£200 0 0
Paid in daily wages	£197 17 0	
Unexpended balance	2 3 0	
	£200 0 0	£200 0 0

Other Charges

GENERAL GRANT.

Appropriated by Act No. 50 of 1931		£2,200 0 0
" " Resolve No. 17 of 1932		50 0 0
Labour on experimental plots, lawns, flower beds, glasshouses and drives	1,629 3 10	
Prison labour	13 12 0	
Cartage and ploughing	118 9 6	
Manure and fertilizers	9 1 0	
Seed potatoes, seeds, etc	48 3 1	
Live stock—feed, bedding and incidentals	200 16 5	
Repairs and renewal of buildings, tools, etc	95 5 0	
Stationery and other office supplies, and printing	126 6 2	
Subscriptions to agricultural periodicals and purchase of books	8 19 6	
Unexpended balance	... 3 6	
	£2,250 0 0	£2,250 0 0

INSPECTION SERVICES, MARKET INVESTIGATIONS AND CONTINGENCIES.

Appropriated by Act No. 50 of 1931					£1,000	0 0
Inspection of vegetables at dock and at Packing Houses	£	227	5	2		
Representation in Canada		360	6	8		
Advertising in Canada		53	19	7		
Exhibit at Agricultural Station		2	6	0		
Shipment of lilies to Canada		6	19	6		
Advertising lily bulbs in England, including cost of bulbs and fee to representative		125	4	11		
Inspection of seed potatoes on Long Island		10	11	8		
Printing		31	17	0		
Shipment of selected seed onions to California		34	5	11		
Cables		135	0	0		
Subscriptions to marketing periodicals		11	17	0		
Unexpended balance		...	6	3		
	£	1,000	0	0	£1,000	0 0

ERADICATION OF ANIMAL DISEASES.

Appropriated by Act No. 50 of 1931					£ 75	0 0
Compensation to owners of condemned stock	£	49	0	0		
Fees to Appraisal Committee		1	12	0		
Fees to Veterinary Officer for professional services		5	1	9		
Supplies and contingencies		10	8	0		
Unexpended balance		8	18	3		
	£	75	0	0	£ 75	0 0

CONTROL OF PLANT AND BULB DISEASES AND PESTS.

Appropriated by Act No. 50 of 1931					£ 150	0 0
Labour	£	12	0	0		
Fungicides and insecticides		56	17	7		
Gasoline and oil		65	4	11		
Repairs to sprayers		5	17	2		
Subscriptions to pathological periodicals		9	18	7		
Unexpended balance		...	1	9		
	£	150	0	0	£ 150	0 0

HORTICULTURE.

Appropriated by Act No. 50 of 1931						£	150	0 0
Labour	£	27	5	0				
Flower pots		10	7	2				
Lead for labels		5	7	1				
Seeds, plants and bulbs		74	0	11				
Dust guns		1	1	0				
Repairs to mower		11	19	7				
Lumber for slat-house		15	10	0				
Subscriptions to horticultural periodicals		4	8	4				
Unexpended balance		...	...	11				
	£	150	0	0		£	150	0 0

DEPARTMENTAL CONTINGENCIES, TRAVELLING EXPENSES, TELEPHONES, LIGHTING, ETC.

Appropriated by Act No. 50 of 1931						£	120	0 0
Carriage hire	£	3	12	0				
Train fares		13	16	1				
Bicycle allowances		13	15	9				
Mimeograph stencil-paper		10	18	0				
Stationery and other office supplies		10	17	4				
Photographs		...	11	10				
Printing		26	15	0				
Telephones		14	7	6				
Electric lights and power		17	13	8				
Repairs to typewriter		3	0	0				
Foreign postage		4	7	5				
Unexpended balance		...	5	5				
	£	120	0	0		£	120	0 0

PACKING HOUSE, SERVICES AND CONTINGENCIES.

Appropriated by Act No. 50 of 1931						£	1,500	0 0
" " Resolve No. 17 of 1932							1,025	0 0
Addition to building:								
Labour	£	114	1	11				
Material, lumber		69	11	10				
Hardware, etc.		39	18	2				
Cement		10	10	0				
Robertson's ventilators		42	12	11	£ 276	15	10	
Packing supplies—liners, wraps and shavings					223	2	4	
Vegetable tyers (2)					45	4	8	
Nails					31	8	1	
Paste for labels					12	15	1	
Rubber stamps					7	17	0	
Printed forms					37	3	6	
Cutting old tomato crates					14	9	10	
Carried Forward					£ 648	16	4	£2,525 0 0

Brought Forward	£	648	16	4	£2,525	0	0
Miscellaneous		3	14	5			
Electrical wiring and current		45	13	1			
Rental of Packing House at Southampton		7	1	0			
Cold storage		98	10	11			
Labour—pasting labels, making crates, grading, packing and other labour charges		1,385	8	5			
Cartage		322	6	11			
Interest on loan from Bank of Bermuda		26	7	4			
Unexpended balance		5	1	7			
	£	2,525	0	0	£2,525	0	0

PURCHASE OF ROTOTILLER.

Appropriated by Resolve No. 11 of 1932					£	140	0	0
Paid for Rototiller	£	140	0	0				
	£	140	0	0	£	140	0	0

ANNUAL AGRICULTURAL EXHIBITION.

Appropriated by Resolve No. 5 of 1932					£	300	0	0
" " " " 17 " "						45	0	0
Labour, material and contingencies	£	345	0	0				
	£	345	0	0	£	345	0	0

(b) REIMBURSEMENT TO GOVERNMENT.

Sale of plants					£	26	1	9
Sale of vegetables						113	4	0
Sale of live stock						26	4	0
Live stock fees						45	0	0
Veterinarian fees						16	7	6
Lily certificates						2	3	0
Spraying services						3	0	0
Fumigation fees						...	4	6
Seedsmen's licenses						1	15	0
Packing House receipts						232	7	4
					£	466	7	1

(c) FARMERS' MARKET.

Balance brought forward					£	14	14	0
Received for hire of stalls						69	0	0
Rental of Market	£	50	0	0				
Lighting		15	15	10				
Carried forward	£	65	15	10	£	83	14	0

Brought Forward	£	65	15	10	£	83	14	0
Cleaning and painting Market—material and labour		15	7	3				
Unexpended balance carried over		2	10	11				
	£	83	14	0	£	83	14	0

HILDA C. LINES,
Clerk, Board of Agriculture.

26th January, 1933.

AGRICULTURAL STATION.

The Agricultural Station is within twenty minutes' walk of Hamilton Post Office, and is situated in east Paget on Point Finger Road near the King Edward VII Memorial Hospital.

At the Station may be seen many trees, shrubs and other plants, the majority of which are labelled. Also vegetable experiment plots and pure-bred live stock.

The offices of the Department of Agriculture are situated at the Agricultural Station, and are open from 7 a.m. to 5 p.m., Sundays excepted.

The Annual Agricultural Exhibition is held on the grounds of the Station. The fourteenth Exhibition will be held on 2nd, 3rd and 4th May, 1933.

GOVERNMENT PACKING HOUSES.

The two Government Packing Houses are situated at the Agricultural Station and at Evans Bay Railway Station, Southampton. Persons who desire to inspect the Packing Houses are requested to first communicate with the Department (Telephone 2477) so that convenient times to visit may be arranged.

Visitors without permits from the Department are not welcomed at the Packing Houses, for such visitors often retard the work of grading and packing because of the crowded condition of the Packing Houses when packing is in progress.

FARMERS' MARKET, HAMILTON.

The Farmers' Market, Front Street, Hamilton, is under the supervision of the Department, and applications to sell therein should be made to the Inspector of Produce.

The Market is open from 8 a.m. to 5 p.m. (10 p.m. on Saturdays) on all days except Sundays and holidays.

INSPECTOR'S OFFICE.

The office of the Inspector of Produce is situated at No. 1 Shed (ground floor), Front Street, Hamilton.